CALIFORNIA DESERT CONSERVATION AREA PLAN AMENDMENT / FINAL ENVIRONMENTAL IMPACT STATEMENT

FOR

IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

FES-10-31

VOLUME I

JULY 2010

BLM

Needles Field Office

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

BLM/CA/ES-2010-010+1793

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Needles Field Office
1303 South U.S. Highway 95
Needles, CA 92363
www.ca.blm.gov/needles

In Reply Refer To:

In reply refer to:
1610-5.G.1.4
2800/CACA-48668

Dear Reader:

Enclosed is the proposed California Desert Conservation Area Plan Amendment and Final Environmental Impact Statement (CDCA Plan Amendment/FEIS) for the Ivanpah Solar Electric Generating System (ISEGS) project. The Bureau of Land Management (BLM) prepared the CDCA Plan Amendment/FEIS for the ISEGS project in consultation with cooperating agencies and California State agencies, taking into account public comments received during the National Environmental Policy Act (NEPA) process. The proposed plan amendment adds the Ivanpah Solar Electric Generating System project site to those identified in the current California Desert Conservation Area Plan, as amended, for solar energy production. The decision on the ISEGS project will be to approve, approve with modification, or deny issuance of the rights-of-way grants applied for by Solar Partners I, II, IV, and VIII.

This CDCA Plan Amendment/FEIS for the ISEGS project has been developed in accordance with NEPA and the Federal Land Policy and Management Act of 1976. The CDCA Plan Amendment is based on the Mitigated Ivanpah 3 Alternative which was identified as the Agency Preferred Alternative in the Supplemental Draft Environmental Impact Statement for ISEGS, which was released on April 16, 2010. The CDCA Plan Amendment/FEIS contains the proposed plan amendment, a summary of changes made between the DEIS, SDEIS and FEIS for ISEGS, an analysis of the impacts of the proposed decisions, and a summary of the written and oral comments received during the public review periods for the DEIS and for the SDEIS, and responses to comments.

The BLM will be accepting additional public comment on the CDCA Plan Amendment/FEIS within 30 days after the Environmental Protection Agency publishes the Notice of Availability in the *Federal Register*. Comments can be sent to: George Meckfessel, Planning and Environmental Coordinator, Needles Field Office, 1303 South Highway 95, Needles, CA 92363, or email caisegs@blm.gov.

Pursuant to the BLM's planning regulations at 43 CFR 1610.5-2, any person who participated in the planning process for the CDCA Plan Amendment and has an interest that is or may be adversely affected by the proposed plan amendment may protest approval of the plan amendment within 30 days from the date the Environmental Protection Agency (EPA) publishes the Notice of Availability in the *Federal Register*. For further information on filing a protest, please see the accompanying protest regulations in the page that follows (labeled as Attachment 1). The regulations specify the required elements in a protest. Protesting parties should take care to

document all relevant facts and, as much as possible, reference or cite the planning documents or available planning records (e.g., meeting minutes or summaries, correspondence, etc.).

All protests must be in writing and mailed to the following address:

Regular Mail:	Overnight Mail:
Director (210)	Director (210)
Attention: Brenda Williams	Attention: Brenda Williams
P.O. Box 66538	1620 L Street, N.W., Suite 1075
Washington, D.C. 20035	Washington, D.C. 20036

Before including your address, phone number, e-mail address, or other personal identifying information in your protest, be advised that your entire protest – including your personal identifying information – may be made publicly available at any time. While you can ask us in your protest to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so.

All protests must be received by the Director by the close of the protest period to be accepted as valid. Protests that are postmarked by the close of the protest period but received by the Director after the close of the protest period will only be accepted as valid if the protesting party also provides a faxed or e-mailed advance copy before the close of the protest period. To provide the BLM with such advance notification, please fax protests to the attention of Brenda Hudgens-Williams- BLM protest coordinator at 202-912-7129, or e-mail protests to: Brenda_Hudgens-Williams@blm.gov.

The BLM Director will make every attempt to promptly render a decision on each valid protest. The decision will be in writing and will be sent to the protesting party by certified mail, return receipt requested. The decision of the BLM Director shall be the final decision of the Department of the Interior. Responses to protest issues will be compiled in a Director's Protest Resolution Report that will be made available to the public following issuance of the decisions.

Upon resolution of all land use plan protests, the BLM will issue a Record of Decision (ROD) adopting the Approved CDCA Plan Amendment and making a decision regarding issuance of the right-of-way grant. Copies of the ROD will be mailed or made available electronically to all who participated in this NEPA process and will be available to all parties through the Needles Field Office website (*http://www.blm.gov/ca/st/en/fo/needles/nefo_nepa.html*), or by mail upon request.

Sincerely,

Raymond C. Lee
Field Manager, Needles

Protest Regulations

[CITE: 43CFR1610.5-2]

TITLE 43--PUBLIC LANDS: INTERIOR
CHAPTER II--BUREAU OF LAND MANAGEMENT, DEPARTMENT OF THE INTERIOR
PART 1600--PLANNING, PROGRAMMING, BUDGETING--Table of Contents
Subpart 1610--Resource Management Planning
Sec. 1610.5-2 Protest procedures.

(a) Any person who participated in the planning process and has an interest which is or may be adversely affected by the approval or amendment of a resource management plan may protest such approval or amendment. A protest may raise only those issues which were submitted for the record during the planning process.

(1) The protest shall be in writing and shall be filed with the Director. The protest shall be filed within 30 days of the date the Environmental Protection Agency published the notice of receipt of the final environmental impact statement containing the plan or amendment in the Federal Register. For an amendment not requiring the preparation of an environmental impact statement, the protest shall be filed within 30 days of the publication of the notice of its effective date.

(2) The protest shall contain:

(i) The name, mailing address, telephone number and interest of the person filing the protest;
(ii) A statement of the issue or issues being protested;
(iii) A statement of the part or parts of the plan or amendment being protested;
(iv) A copy of all documents addressing the issue or issues that were submitted during the planning process by the protesting party or an indication of the date the issue or issues were discussed for the record; and
(v) A concise statement explaining why the State Director's decision is believed to be wrong.

(3) The Director shall promptly render a decision on the protest.

(b) The decision shall be in writing and shall set forth the reasons for the decision. The decision shall be sent to the protesting party by certified mail, return receipt requested. The decision of the Director shall be the final decision of the Department of the Interior.

ABSTRACT

ENVIRONMENTAL IMPACT STATEMENT

IVANPAH SOLAR ELECTRIC GENERATING SYSTEM PROJECT

( ) Draft (X) Final

Lead Agency: The United States Department of the Interior, Bureau of Land Management Needles Field Office

Location: San Bernardino County, California

Address Protests on this Proposed Plan Amendment to:

Regular Mail:
Attn: Brenda Williams
Director (210)
PO Box 66538
Washington, DC 20035

Overnight Mail:
Attn: Brenda Williams
Director (210)
1620 L Street NW Suite 1075
Washington, DC 20036

Address Comments on this EIS to: Bureau of Land Management Attention: George Meckfessel, Planning and Environmental Coordinator, 1303 S. Hwy. 95, Needles, CA 92363

or Email: caisegs@blm.gov

Comment Deadline: 30-days from date of EPA Notice of Availability.

The Bureau of Land Management (BLM) has received a proposal from Solar Partners I, II, IV, and VIII, limited liability corporations formed by BrightSource Energy (BrightSource), to construct and operate a solar thermal electric generating facility in San Bernardino County, California. The project would generate up to 400 megawatts (MW) of electricity using solar thermal technology.

The proposed project was analyzed in a Draft Environmental Impact Statement that was published on November 13, 2009. The proposed project consists of three separate solar generating facilities, each consisting of a field of heliostats (mirrors) reflecting solar radiation to the top of a 459-foot tall power tower received unit. Heated fluid within the power tower receivers would be used to boil water to generate steam, which would turn a turbine and generate electricity. The permanent ROW required for the heliostat fields and power towers would occupy approximately 3,670 acres. An additional 377 acres would be used to support a Construction Logistics Area, and for shared facilities such as an administration building, maintenance warehouse, substation, and groundwater supply wells. Approximately 24 acres would be used for a natural gas supply pipeline ROW, and for access roads. The proposed project would cause the surface disturbance of approximately 4,073 acres during construction.

Two additional alternatives were considered in detail in the Supplemental Draft Environmental Impact Statement (SDEIS), which was published by BLM on April 16, 2010. SDEIS analyzed a reduced acreage alternative called the Mitigated Ivanpah 3 Alternative, and a reconfigured alternative called the Modified I-15 Alternative. The facility evaluated in each of these alternatives is a solar thermal electric generating facility with a generating capacity of 370 MW.

The Mitigated Ivanpah 3 Alternative is identified as the agency preferred alternative in this EIS.

TABLE OF CONTENTS

Volume I

Volume II

Volume III

LIST OF APPENDICES

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

μg/m^3	micrograms per cubic meter
AAQS	ambient air quality standards
AB	Assembly Bill
AC	alternating current
ACC	air cooled condensers
ACEC	Area of Critical Environmental Concern
AED	automatic external defibrillator
AFY	acre-feet per year
AFC	Application for Certification
AML	Appropriate Management Levels
amsl	above mean sea level
ANSI	American National Standards Institute
AO	Authorized Officer
APLIC	Avian Powerline Interaction Committee
AQCMM	Air Quality Construction Mitigation Manager
AQCMP	Air Quality Construction Mitigation Plan
ARB	Air Resource Board
ARMR	Archaeological Resource Management Report
ARRA	American Recovery and Reinvestment Act of 2009
ASME	American Society for Material Engineering
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
ATC	Authority to Construct
ATCM	Airborne Toxic Control Measure
AUM	animal unit months
BA	Biological Assessment
BACT	Best Available Control Technology
BCC	Birds of Conservation Concern
BLM	Bureau of Land Management
BMP	best management practice
BNSF	Burlington Northern Santa Fe
BO	Biological Opinion
BOE	Board of Equalization
BRMIMP	Biological Resources Mitigation Implementation and Monitoring Plan
BVUSD	Baker Valley Unified School District
CAA	Clean Air Act
CAISO	California Independent System Operator
Cal-ARP	California Accidental Release Program
CAM	crassulacean acid metabolism
CAPCOA	California Air Pollution Control Officers Association
CBO	Chief Building Official
CBSC	California Building Standards Code

CCDOA	Clark County Department of Aviation
CCR	California Code of Regulations
CCSD	Clark County School District
CCTV	Closed Circuit TV
CDCA	California Desert Conservation Area
CDD	California Desert District
CDFA	California Department of Food and Agriculture
CDFG	California Department of Fish and Game
CDMG	California Department of Water Resources
CDPH	California Department of Public Health
CEMS	continuous emissions monitoring system
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFATS	Chemical Facility Anti-Terrorism Standard
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGS	California Geological Survey
CHP	California Highway Patrol
CHRIS	California Historical Resources Information System
CLA	Construction Logistics Area
CMP	Congestion Management Plan
CNDDB	California Department of Fish and Game Natural Diversity Database
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
COC	Condition of Certification
CPM	Construction Project Manager
CPUC	California Public Utilities Commission
CRHR	California Register of Historical Resources
CRM	Cultural Resource Monitor
CRMMP	Cultural Resources Monitoring and Mitigation Plan
CRR	Cultural Resource Report
CRS	Cultural Resources Specialist
CSP	Concentrated Solar Power
CSS	Construction Safety Supervisor
CUPA	Certified Unified Program Authority
CVC	California Vehicle Code
CWA	Clean Water Act
DEHS	Department of Environmental Health Services
DEIS	Draft Environmental Impact Statement
DEM	digital elevation model
DESCP	Drainage Erosion and Sediment Control Plan
DHS	U.S. Department of Homeland Security
DOE	U. S. Department of Energy

DOI	U. S. Department of Interior
DOT	U.S. Department of Transportation
DPA	Desert Protection Act
DPM	Diesel Particulate Matter
DPR	Department of Parks and Recreation
DRP	Demand Response Program
DTRO	Desert Tortoise Recovery Office
DTRPAC	Desert Tortoise Recovery Planning Assessment Committee
DTSC	Department of Toxic Substances Control
DWMA	Desert Wildlife Management Area
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EITL	Eldorado-Ivanpah Transmission Line
EITP	Eldorado-Ivanpah Transmission Project
EMF	electric and magnetic field
EMS	emergency medical services
EPA	U.S. Environmental Protection Agency
EPAct	Energy Policy Act of 2005
EPS	Emission Performance Standard
ERC	emission reduction credit
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FDOC	Final Determination of Compliance
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FGR	flue gas recirculation
FHWA	Federal Highway Administration
FLPMA	Federal Land Policy and Management Act
FONSI	Finding of No Significant Impact
fps	feet per second
FSA	Final Staff Assessment
FTA	Federal Transit Administration
GHG	Greenhouse Gas
GPS	global positioning system
GWh	gigawatt-hours
H_2S	hydrogen sulfide
HAER	Historic American Engineering Record
HAP	Hazardous Air Pollutant
HARP	Hotspots Analysis and Reporting Program
HDP	Heritage Documentation Program
HFC	hydrofluorocarbon
HI	Hazard Index
HMA	Herd Management Area
HMBP	Hazardous Materials Business Plan

hp	horsepower
HSC	Health and Safety Code
IEEE	Institute of Electrical and Electronics Engineers
IEPR	Integrated Energy Policy Report
IIPP	Injury and Illness Prevention Program
IM	Instruction Memorandum
ISC	Interruptible Service Contract
ISEGS	Ivanpah Solar Electric Generating System
ISO	Independent System Operator
IVAB	Ivanpah Valley Air Basin
IVGB	Ivanpah Valley Groundwater Basin
KOP	Key Observation Point
KRGT	Kern River Gas Transmission Company
kV	kilovolt
kW	kilowatt
lb	pound
LID	Low-Impact Development
LOS	Level of Service
LRP	Load Reduction Program
LVMPD	Las Vegas Metropolitan Police Department
m	meter
MBTA	Migratory Bird Treaty Act
MCL	Maximum Contaminant Levels
MCLB	Marine Corps Logistics Base
MCR	Monthly Compliance Report
MDAB	Mojave Desert Air Basin
MDAQMD	Mojave Desert Air Quality Management District
MEER	mechanical and electrical equipment room
mG	milligauss
mg/l	milligrams per liter
MLD	Most Likely Descendent
MMBtu/hr	million British thermal units per hour
MNP	Mojave National Preserve
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MPE	maximum permissible exposure
mph	miles per hour
MSA	Metropolitan Statistical Area
MT	metric tons
MTCO2E	metric tons of CO_2 equivalent
MUC	Multiple-Use Class
MVA	megavolt-ampere
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission

NCA	Noise Compatibility Area
NEMO	Northern and Eastern Mojave
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
NFWF	National Fish and Wildlife Foundation
NH_3	ammonia
NHPA	National Historic Preservation Act
NIOSH	National Institute of Safety and Health
NO	nitric oxide
NO_2	nitrogen dioxide
NO_3	nitrates
NOA	Notice of Availability
NOI	Notice of Intent
NOx	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places
NSPS	New Source Performance Standards
NSR	New Source Review
NTP	Notice to Proceed
O&M	operations and maintenance
O_3	ozone
°C	degrees Celsius
OCA	Off-site Consequence Analysis
OEHHA	Office of Environmental Health Hazard Assessment
OHV	off-highway vehicle
OLM	Ozone Limiting Method
ORV	off-road vehicle
OSHA	Occupational Safety and Health Administration
OTC	once-through cooling
PAH	Polynuclear Aromatic Hydrocarbon
PAO	Public Adviser's Office
PAR	Property Analysis Record
PCF	paid-call firefighters
PDOC	Preliminary Determination of Compliance
PEA	Proponent's Environmental Assessment
PEIS	Programmatic Environmental Impact Statement
PFC	perfluorocarbon
PM	Particulate Matter
PMAP	Particulate Matter Attainment Plan
PMI	point of maximum impact
POD	Plan of Development
PPE	personal protective equipment

ppm	parts per million
PRC	Public Resources Code
PRM	Paleontological Resource Monitors
PRMMP	paleontological resources monitoring and mitigation plan
PRR	Paleontological Resources Report
PRS	paleontological resource specialist
PSA	Preliminary Staff Assessment
PSD	Prevention of Significant Deterioration
PTO	Permit to Operate
PTZ	pan, tilt, and zoom
PUP	Pesticide Use Proposal
PV	photovoltaic
PVMRM	Plume Volume Molar Ratio Method
PYFC	Potential Fossil Yield Classification
QFER	Quarterly Fuel and Energy Report
RC	Resource Conservation
RCRA	Resource Conservation Recovery Act
REAT	Renewable Energy Action Team
RETI	Renewable Energy Transmission Initiative
RMP	Resource Management Plan
ROD	Record of Decision
ROW	right-of-way
RPS	Renewables Portfolio Standard
RWQCB	Regional Water Quality Control Board
SAC	Science Advisory Committee
SANBAG	San Bernardino Associated Governments
SB	Senate Bill
SBAIC	San Bernardo Archeological Information Center
SBCFD	San Bernardino County Fire Department
SCADA	Supervisory Control and Data Acquisition
SCE	Southern California Edison
SDEIS	Supplemental Draft Environmental Impact Statement
SEGS	Solar Electric Generating System
SF_6	sulfur hexafluoride
SHPO	State Historic Preservation Officer
SMARA	Surface Mining and Reclamation Act
SO_2	sulfur dioxide
SO_4	sulfates
SOx	sulfur oxide
SPCC	spill prevention, control, and countermeasures
STG	steam turbine-generator
SVP	Society of Vertebrate Paleontology
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resource Control Board

TAC	toxic air contaminant
TCP	Traffic Control Plan
TDS	total dissolved solids
TUC	Transportation Utility Corridor
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
USCS	Unified Soils Classification System
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
V/C	volume-to-capacity
VMT	vehicle miles travelled
VOC	volatile organic compound
VR	Visual Resource
VRI	Visual Resource Inventory
VRM	Visual Resource Management
WA	Wilderness Area
WEAP	Worker Environmental Awareness Program
WEC	wave energy conversion
WECC	Western Electricity Coordinating Council
WIU	Wilderness Inventory Units
WWTP	Wastewater Treatment Plant

1.0 Executive Summary

1.1 Introduction

The proposed action evaluated within this Environmental Impact Statement (EIS) is the construction and operation of the Ivanpah Solar Electric Generating System (ISEGS) project, a proposed solar-thermal electricity generation facility located on public lands managed by the Bureau of Land Management (BLM) in San Bernardino County, California. The EIS represents the environmental review document developed by the BLM to evaluate potential impacts associated with the proposed action. The EIS also functions as the environmental evaluation of a proposed amendment to BLM's California Desert Conservation Area (CDCA) Plan, which would identify the ISEGS site within the Plan.

Solar Partners I, LLC; Solar Partners II, LLC; Solar Partners IV, LLC; and Solar Partners VIII, LLC, which are subsidiaries of BrightSource Energy, Inc. (applicant or BrightSource Energy), filed an Application for Certification (AFC) (07-AFC-5) for the proposed ISEGS. The proposed ISEGS project and related facilities are under the Energy Commission's jurisdiction and require certification by the California Energy Commission to operate the facility. As the proposed project would be located on public land, BrightSource Energy has also filed an application to BLM for a land use Right-of-Way pursuant to the Federal Land Policy and Management Act (FLPMA). Under FLPMA Title V (Rights-of-Way), the Secretary of Interior is authorized to grant rights-of-way for the purpose of allowing systems for generation, transmission, and distribution of electric energy. BrightSource Energy has also applied to the U.S. Department of Energy (DOE) for a loan guarantee pursuant to Title XVII of the Energy Policy Act. The project would be developed in three phases, known as Ivanpah 1, 2, and 3. The application for a loan guarantee for Ivanpah 1 was made in November 2008, and the application for Ivanpah 2 and 3 was made in February 2009. BrightSource Energy has also applied to the U.S. Treasury Department for Payments for Specified Energy Property in Lieu of Tax Credits under §1603 of the American Recovery and Reinvestment Act of 2009 (Public Law 111-5). This program offers a grant (in lieu of investment tax credit) to receive funding for 30% of the total capital cost at such time as a project achieves commercial operation (currently applies to projects that begin construction by December 31, 2010 and begin commercial operation before January 1, 2017). Pursuant to Treasury Department guidance ("Payments for Specified Energy Property in Lieu of Tax Credits under the American Recovery and Reinvestment Act of 2009", U.S. Treasury Department Office of the Fiscal Assistant Secretary, July 2009/ Revised March 2010) a Section 1603 payment with respect to specified energy property does not make the property subject to the requirements of National Environmental Policy Act (NEPA) and similar laws.

This EIS examines the environmental and public health and safety aspects of the proposed project, based on the information provided by the applicant, that received through public comment, and that received from other sources available at the time the EIS was prepared. The EIS contains analyses required as part of an EIS prepared under the NEPA.

BLM is the lead agency for the NEPA review of the proposed Right-of-Way and associated CDCA Plan Amendment. In August, 2007, the California Energy Commission (Energy Commission) and BLM California State Office entered into a Memorandum of Understanding (MOU) to jointly develop the environmental analysis documentation for solar thermal projects which are under the jurisdiction of both agencies. The purpose of the MOU is to avoid duplication of the agency efforts, share the agency's expertise and information, promote intergovernmental coordination, and facilitate public review. On November 4, 2009, the BLM and California Energy Commission (Energy Commission) staff jointly prepared the Final Staff Assessment (FSA)/Draft Environmental Impact Statement (DEIS) and Draft CDCA Plan Amendment for the ISEGS project. The Notice of Availability of the DEIS was published on November 10, 2009; the 90-day public review and comment period ended on February 11, 2010.

After publication of the DEIS, additional information regarding two of the alternatives identified and evaluated in the DEIS (the Reduced Acreage Alternative and the I-15 Alternative) was obtained by BLM through the Energy Commission public hearing and BLM public comment processes. Based on the receipt of these additional data, BLM concluded that the rationale for eliminating the Reduced Acreage and I-15 Alternatives in the DEIS was insufficient, and that these two alternatives merited more detailed evaluation in a Supplemental DEIS (SDEIS). The Notice of the Availability of the SDEIS was published on April 16, 2010; the 45-day public review and comment period ended on June 1, 2010.

In support of its Right-of-Way and CDCA Plan Amendment processes, the BLM has the responsibility to evaluate the environmental impacts of the proposed action, the No Action alternative, and other alternative actions that may meet the purpose and need for the proposed project. The Final EIS (FEIS) will be available for public review for 30-days before the BLM issues a Record of Decision (ROD). The decision regarding the ROW grant is appealable to the Interior Board of Land Appeals upon issuance of the ROD. The plan amendment decision is not an appealable decision but may be judicially challenged in Federal District Court.

1.2 Project Location and Description

The applicant has proposed to locate the ISEGS project in the Mojave Desert, near the Nevada border in San Bernardino County, California, on land administered by BLM. The proposed project site is located 4.5 miles southwest of Primm, Nevada and 0.5 mile west of the Primm Valley Golf Club which is located just west of the Ivanpah Dry Lake. Access to the site is from the Yates Well Road Interchange on I-15 via Colosseum Road.

The proposed ISEGS project is a solar concentrating thermal power plant, which is comprised of fields of heliostat mirrors focusing solar energy on boilers located on centralized power towers. Each mirror will track the sun throughout the day and reflect the solar energy to the receiver boiler. In each plant, one Rankine-cycle reheat steam turbine receives live steam from the solar boilers and reheats steam from the solar reheater. The solar field and power generation equipment would be put into operation

each morning after sunrise and insolation build-up, and shut down in the evening when insolation drops. Electricity would be produced by each plant's solar receiver boiler and the steam turbine generator.

The applicant proposes to develop the ISEGS project in three phases which are designed to generate a total of 400 MW of electricity. The first two phases of the project, Ivanpah 1 and 2, are designed to provide 100 MW of electricity and would occupy approximately 914 acres and 921 acres respectively; the 200 MW phase, Ivanpah 3, would require occupy approximately 1,836 acres. All three phases would be share an administration building, an operation and maintenance building, and substation which would be located in between Ivanpah 1 and 2 requiring an additional area of approximately 25 acres. Linear facilities, including re-routing of Colosseum Road, and natural gas, water, and transmission lines would require an additional 56 acres. Another 321 acres is needed for construction staging activities. ISEGS total project footprint amounts to approximately 4,073 acres (approximately 6.4 square miles).

The detailed description of the proposed project is documented within the applicant's Application for Certification to the Energy Commission (CH2M Hill 2007), as well as numerous applicant-submitted documents, responses to Data Requests, and management plans. These documents are all publicly available on the Energy Commission website at http://www.energy.ca.gov/sitingcases/ivanpah/index.html. These documents are referenced throughout the text of this FEIS where applicable, but are not otherwise attached as appendices to this FEIS.

Solar Power Plant Equipment and Facilities

Heliostats

Each heliostat would be configured with two mirrors hung in the portrait position. Each mirror would be 7.2 feet high by 10.5 feet wide, providing a reflective surface of 75.6 square feet (7.04 m^2) per mirror or 14.08 m^2 per heliostat (See Figure 3-4). The heliostats would be connected with communication cables strung aboveground between each heliostat. The communications cables would transmit signals from a computer-programmed aiming control system that would direct the movement of each heliostat to track the movement of the sun (CH2M Hill 2009a). The number of heliostats described under the Optimized Project Design (55,000 each for Ivanpah 1 and 2, and 104,000 for Ivanpah 3) represents the maximum number of heliostats that would be constructed; however, all of them may not be constructed.

Solar Power Towers

The site design would include one power tower for each Ivanpah 1 and 2 and five towers within Ivanpah 3, with heights of 459 feet each. The central power tower of Ivanpah 3 would include the power block with one steam turbine-generator (STG) supplied superheated steam by the five power tower boilers. Steam from the four quadrant solar power tower boilers would be conveyed by above-ground pipeline. Each solar power tower would be a metal structure designed specifically to support the boiler and efficiently move high-quality steam through a STG at its base. The power tower support structure would be about 120 meters high (approximately 393 feet). The

receiving boiler (which sits on top of the support structure) would be 20 meters tall (approximately 66 feet) including the added height for upper steam drum and protective ceramic insulation panels (See Figure 3-5). Additionally, a Federal Aviation Administration (FAA)-required lighting and a lightning pole would extend above the top of the towers approximately 10 feet. The height of the power towers allows heliostats from significant distances to accurately reflect sunlight to the receiving boiler. The receiving boiler is a traditional high-efficiency boiler positioned on top of the power tower. The boiler converts the concentrated energy of the sun reflected from the heliostats into superheated steam. The boiler's tubes are coated with a material that maximizes energy absorbance. The boiler has steam generation, superheating, and reheating sections and is designed to generate superheated steam at a pressure of 160 bars and a temperature of 550 degrees Celsius (°C).

Power Block

Each solar power plant (Ivanpah 1, 2 and 3) would have a power block located in the approximate center of the power plant area. The power block would include a solar power tower, a receiver boiler, a STG set, air-cooled condensers, and other auxiliary systems. Each of the three solar-thermal plants would include the following equipment and facilities in their power block:

- natural gas-fired start-up boiler;
- the air emission control system for the combustion of natural gas in the start-up boiler;
- steam turbine generator;
- air-cooled condenser;
- auxiliary equipment (feed water heaters, a de-aerator, an emergency diesel generator, diesel fire pump, etc.);
- a raw water tank with a 250,000 gallon capacity, to supply water for plant use and fire fighting; and a
- water treatment system.

<u>Related Equipment and Facilities</u>

Natural Gas Pipeline

The solar heat used in the boiler (steam) process would be supplemented by burning natural gas to heat a partial load steam boiler when solar conditions are insufficient. Each power plant within the project would include a small package, natural gas-fired start-up boiler to provide additional heat for plant start-up and during temporary cloud cover. Natural gas would be supplied to the site through a new, proposed six-mile long distribution pipeline ranging from 4 to 6 inches in diameter. From the Kern River Gas Transmission pipeline, the pipeline would extend 0.5 miles south to the northern edge of Ivanpah 3. The line would then run east along the northern edge, and then south along the eastern edge, of Ivanpah 3 to a metering station near the southeast corner of Ivanpah 3. From there, a supply line would extend northwest into the Ivanpah 3 power

block. The main pipeline would continue along the eastern edge of Ivanpah 2 to another metering station at its southeastern corner. Again, a branch supply line will extend northwestwards into the center of the Ivanpah 2 power block. From that station, the pipeline would follow the paved access road from Colosseum Road past the administration/warehouse building to the Ivanpah 1 power block. A new tap metering station of approximately 100 feet by 150 feet in area would be located at the Kern River Gas Transmission Line.

Air Pollution Control

Air pollution emissions from the combustion of natural gas in the start-up boiler would be controlled using best available control technology. Each boiler would be equipped with low-Nitrogen Oxide (NOx) burners for NOx control. Carbon Monoxide (CO) would be controlled using good combustion practices such as burner and control adjustment based on oxygen continuous monitoring, operator training and proper maintenance. Particulate and Volatile Organic Compounds (VOC) emissions will be minimized through the use of natural gas as the fuel.

Water Supply and Discharge

The facilities would require a water source to support operations, including process water consisting of make-up water for the steam system and wash water for the heliostats, and potable water for domestic water needs. Groundwater would be supplied from one of two wells that would be constructed at the northwest corner of Ivanpah 1, just outside the perimeter fence but within the construction logistics area. Each of the three power blocks would be connected to the groundwater wells by underground water pipelines. The applicant estimates project water consumption would not exceed a maximum of 100 acre-feet per year for all three solar plants combined, which would primarily be used to provide water for washing heliostats (mirrors) and to replace boiler feed water blow-down.

The quality of groundwater would be improved using a treatment system for meeting the requirements of the boiler make-up and mirror wash water. Water treatment equipment would consist of activated carbon filters, de-ionization media, and a mixed-bed polisher. Each power plant would have a 250,000 gallon raw water storage tank. Approximately 100,000 gallons would be usable for plant process needs and 150,000 gallons would be reserved for fire protection. Demineralized water would be stored in a 25,000-gallon demineralized water storage tank. Boiler feedwater make-up water would be stored in another 25,000-gallon tank.

Fire Protection

The fire protection system would be designed to protect personnel and limit property loss and plant downtime in the event of a fire. The primary source of fire protection water would be the 250,000 gallon raw water storage tank to be located in each power block. Approximately 100,000 gallons would be usable for plant process needs and 150,000 gallons would be reserved for fire protection. All fire protection systems would be focused on the power blocks, administration/warehouse building, and other areas of active operations. The project would not include any specific facilities to address potential wild fires.

Access Roads and Maintenance Paths

Access to the project site would occur from the Yates Well Road exit from I-15 to Colosseum Road. Colosseum Road, currently a dirt road, would be paved to a 30-foot wide, two lane road for a distance of 1.9 miles from the Primm Valley Golf Club to the facility entrance. Because the current route of Colosseum Road would be incorporated into the Ivanpah 2 plant site, the road would be re-routed around the southern end of Ivanpah 2 before re-joining the current road to the west of the proposed facility. Within the heliostat fields, maintenance paths would be established concentrically around the power blocks to provide access for heliostat washing and maintenance. The paths would be established between every other row of heliostats. An additional maintenance path would be established on the inside perimeter of the boundary fence. Within each unit, a diagonal dirt road would be established to provide access to the concentric maintenance paths and the power blocks.

Off-road, recreational vehicle trails currently authorized by BLM which run through the proposed project site would be re-located outside of the project boundary fence. The project boundary would overlap three existing open route designations; route 699226, route 699198, and a segment of Colosseum Road. Approximately 7,200 feet of route 699226 would be cut off by the Ivanpah 3 facility and another 6,500 feet of route 669198 would be cut off by the Ivanpah 2 facility. An estimated 5,000 feet of the Colosseum Road would also be cut off by the Ivanpah 2 facility. The closed portions of the three routes would be removed from the list of open routes on BLM's Off Highway Vehicle designation. The replacement routes would be part of the ROW grant for the project, and would remain open and maintained by the applicant for the life of the facility. The redirected routes and Colosseum Road would be designed and constructed to minimize damage to soil, watershed, vegetation, and air resources. These routes would be monitored by the applicant to avoid disruption to wildlife resources.

Construction Logistics Area, Substation, and Administrative Complex

The applicant proposes using a temporary construction logistics area for staging contractor equipment and trailers, assembly yards, storage of materials, equipment laydown and wash area, construction personnel parking, and assembly areas for heliostats. The construction logistics area would be located between Ivanpah 1 and 2 and would comprise approximately 377.5 acres. Following project construction, the majority of the area would undergo site closure, rehabilitation, and revegetation as described in the Draft Closure, Revegetation, and Rehabilitation Plan (CH2M Hill 2009b).

Fencing

The project area would be surrounded by security fence, which would be constructed of 8-foot tall galvanized steel chain-link, with barbed wire at the top as required. The security fence would surround the outer perimeter of each power plant, the substation, and the administrative complex. Tortoise barrier fence would also be installed in accordance with the Recommended Specifications for Desert Tortoise Exclusion Fencing (USFWS 2005). The tortoise fence would consist of 1-inch horizontal by 2-inch vertical galvanized welded wire. The fence would be installed to a depth of 12 inches,

and would extend 22 to 24 inches above the ground surface and integrated with the security fence.

In addition to use of the proposed right-of-way area, the applicant proposes some project-related activities to occur outside of the project fence, on land not included within the proposed right-of-way area. These would include inspection and maintenance of the fence, underground utility repairs, maintenance of drainage systems, and possible installation of new stormwater drainage systems. As discussed with respect to Access Roads above, a roadway would need to be maintained outside of the project fence to allow vehicle and equipment access for these activities.

Transmission System Interconnection and Upgrades

Onsite Transmission Facilities

The ISEGS project would deliver power from Ivanpah 1, 2 and 3 via three separate 115-kilovolt (kV) transmission generation tie lines to a new Ivanpah substation that would be owned and operated by Southern California Edison and located in the common construction logistics area between Ivanpah 1 and 2. The new Ivanpah substation would be about 850 feet by 850 feet and located on a little over 16 acres. Each of the power plants would have a switchyard with a step-up transformer to increase the 13.8 kV generator output voltage to 115 kV. The ISEGS #1 115 kV generator tie line would be approximately 5,800 feet long and supported by single-pole structures. The ISEGS #2 and #3 generator tie lines would share the same poles for the last 1,400 feet of their routes before they interconnect to SCE's Ivanpah Substation. The ISEGS #2 generator would connect to the Ivanpah Substation through a 115kV, 3,900 feet-long single circuit generator tie line built with the last 1,400 feet merged with the ISEGS #3 generator tie line to create a 1,400 feet long, overhead double circuit line prior to entering the Ivanpah Substation. The ISEGS #3 generator tie line would be an approximately 14,100 feet long, single circuit, 115 kV line and would merge into a 115kV double circuit with the ISEGS #2 generator tie line. In accordance with the Interconnection Agreement between the applicant and SCE, the existing Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115-kV line would loop in and out through the newly built Ivanpah Substation to interconnect the project to the SCE transmission grid. This 115-kV line is currently aligned between the Ivanpah 1 and 2 sites along a northeast-southwest right-of-way.

Eldorado – Ivanpah Transmission Line

In order to accommodate the total anticipated 1,400 MW load generation by ISEGS and five other planned renewable energy generation projects in the region, the California Independent System Operator (California ISO) has identified approximately 36 miles of transmission line within California and Nevada that would need to be upgraded from 115 kV to 230 kV. This upgrade of SCE's existing 115-kV line is known as the Eldorado-Ivanpah Transmission Project (EITP). Because the EITP is to be implemented by a different applicant and would occur whether or not the ISEGS proposed project were implemented, it is independent of the proposed ISEGS project, and is currently undergoing a separate environmental review under a joint Environmental Impact Report (EIR) and EIS by the California Public Utilities Commission (CPUC) and BLM. However, since the two projects would be directly linked, additional detailed information

regarding the scope of the EITP is provided in the following paragraphs. In the ISEGS FSA/DEIS, the EITP was considered a reasonably foreseeable future project because the proponent had not developed the project in enough detail to begin a joint analysis with ISEGS. That detailed project information on EITP is now available, so EITP is considered to be a cumulative action in this FEIS. The evaluation of cumulative impacts associated with the combination of the proposed ISEGS project with the EITP, presented in Section 5, is supported by additional information that was presented in the Draft EIR/EIS for the EITP, which was published on May 7, 2010. If the reader should desire additional detailed information regarding the EITP project, that information is available in the Draft EIR/EIS.

Telecommunications Facilities

The proposed Ivanpah Substation would also require that new telecommunication infrastructure be installed to provide protective relay circuit and a supervisory control and data acquisition (SCADA) circuit, together with data and telephone services. The telecommunication path from Ivanpah Substation to the local carrier facility interface at Mountain Pass area consists of approximately eight miles of fiber optic cable to be installed overhead on existing poles and through new underground conduits to be constructed in the substation and telecom carrier interface point. The fiber cable would be installed on the existing 12-kV distribution line poles.

Project Design and Management Approach

Stormwater Management Approach

The proposed project site is located on an alluvial fan that acts as an active stormwater conveyance between the Clark Mountain Range to the west and the Ivanpah Dry Lake to the east. The applicant's proposed stormwater design and management system is a Low-Impact Development (LID) design concept which attempts to minimize disruption to natural stormwater flow pathways. The elements of the applicant's design approach include minimizing the areas of direct removal of vegetation, minimizing the areas of grading and leveling, and minimizing the amount of active management of stormwater in engineered channels, ponds, and culverts.

Project Construction

The applicant anticipates ISEGS construction would be performed in the following order: 1) the Construction Logistics Area; 2) Ivanpah 1 (the southernmost site) and other shared facilities; 3) Ivanpah 2 (the middle site); and 4) Ivanpah 3 (the 200-MW plant on the north). However, it is possible that the order of construction may change. The shared facilities will be constructed in connection with the first plant construction, whether it is Ivanpah 1, 2, or 3. Prior to construction, geotechnical testing, heliostat installation tests, and heliostat load tests would be performed in each of the three units. Construction is planned to take place over approximately 48 months, with the applicant's desire that it could begin during the first quarter of 2010 and be completed during the fourth quarter 2013.

Project construction would be performed in accordance with plans and mitigation measures that would assure the project conforms with applicable laws and regulations

and would avoid or minimize adverse impacts. These plans that are to be developed by the applicant, for which some have already been prepared in draft and reviewed by BLM to support this environmental analysis, are specified in the mitigation measures as appropriate of each technical area of this FEIS. Of the plans already prepared in draft by the applicant, those that have contributed most significantly to define the proposed plan of development, including construction procedures, are as follows:

- Draft Contractor Health and Safety Standards (CH2M Hill 2009c)
- Administrative Draft ISEGS Construction Stormwater Pollution Prevention Plan (CH2M Hill 2009d)
- Preliminary Draft Plan, Revision 2, Drainage, Erosion, and Sediment Control Plan (CH2M Hill 2009e)
- Draft Raven Management Plan, ISEGS (CH2M Hill 2008a)
- Draft Desert Tortoise Translocation/Relocation Plan for ISEGS (CH2M Hill 2009f)
- Application for Incidental Take Permit Under Section 2081 of the Fish and Game Code (CH2M Hill 2009g)
- Draft Biological Assessment for the ISEGS Project (CH2M Hill 2008b)
- Streambed Alteration Agreement Application (CH2M Hill 2009h)
- Weed Management Plan for ISEGS, Eastern Mojave Desert (CH2M Hill 2008c)

The proposed facilities and procedures described in these documents have been used by BLM throughout the EIS process to evaluate potential impacts and mitigation measures. The documents have also undergone revision by the applicant throughout the process, in response to comments and questions from BLM and the Energy Commission. The documents are publicly available on the Energy Commission website at http://www.energy.ca.gov/sitingcases/ivanpah/index.html.

Facility Operation and Maintenance

The proposed project would be designed for an operational life of 50 years. During this period, project operations would be supported by a variety of operational, maintenance, and monitoring activities. Within the power blocks, operations would include transmission of water and natural gas into the power block, and operation of the natural gas-fired start-up boiler, the air emission control system for the combustion of natural gas in the start-up boiler, a steam turbine generator, an air-cooled condenser, and auxiliary equipment (feed water heaters, a de-aerator, and an emergency diesel generator, diesel fire pump).

Within the heliostat fields, operations would include routine washing of mirrors on a rotating basis, every two weeks. Washing would utilize water accessed from the groundwater supply wells, following treatment in the water treatment system. Washing would be done using a truck-mounted pressure washer. Maintenance would also include clipping of vegetation that could interfere with mirror movement to a height of 12 – 18 inches, management of weeds as specified in the Applicant's Weed Management

Plan (CH2M Hill 2008c), and use of soil binder and weighting agents to minimize dust accumulation on the mirrors and fugitive dust as could occur by wind or vehicle traffic.

Waste Management

Non-hazardous solid wastes generated during construction would include approximately 280 tons of scrap wood, concrete, steel/metal, paper, glass, scrap metals and plastic waste (CH2M Hill 2007, § 5.14.4.1.1). All non-hazardous wastes would be recycled to the extent possible and non-recyclable wastes would be collected by a licensed hauler and disposed in a Class III solid waste disposal facility. Hazardous wastes would be recycled to the extent possible and disposed in either a Class I or II waste facility as appropriate. All operational wastes produced at ISEGS would be properly collected, treated (if necessary), and disposed of at either a Class I or II waste facility as appropriate. Wastes include process and sanitary wastewater, nonhazardous waste and hazardous waste, both liquid and solid. A septic system for sanitary wastewater would be located at the administration building/operations and maintenance area, located between Ivanpah 1 and 2. Portable toilets would be placed in the power block areas of each the three solar facilities and pumped by a sanitary service provider. Process wastewater from all equipment, including the boilers and water treatment equipment would be recycled.

Hazardous Waste Management

Hazardous materials used during facility construction and operations would include paints, epoxies, grease, transformer oil, and caustic electrolytes (battery fluid). Several methods would be used to properly manage and dispose of hazardous materials and wastes. Waste lubricating oil would be recovered and recycled by a waste oil recycling contractor. Chemicals would be stored in appropriate chemical storage facilities. Bulk chemicals would be stored in large storage tanks, while most other chemicals would be stored in smaller returnable delivery containers. All chemical storage areas would be designed to contain leaks and spills in concrete containment areas.

Project Decommissioning

Following the operational life, estimated at 50 years, the project owner would perform site closure activities to meet federal and state requirements for the rehabilitation and revegetation of the project site after decommissioning. The procedures to be used for project decommissioning and restoration are defined in the Applicant's Closure, Revegetation, and Rehabilitation Plan – Revision 3 (CH2M Hill 2010). Under this plan, all aboveground structures and facilities would be removed offsite for recycling or disposal. Areas that had been graded would be restored to original contours. Succulent plant species would be salvaged prior to construction, transplanted into windrows, and maintained for later transplanting following decommissioning. Shrubs and other plant species would be revegetated by the collection of seeds and re-seeding following decommissioning. Decommissioning would be subject to many of the same environmental protection plans as are required for construction.

Mitigation Measures

Mitigation measures have been developed that would be implemented during all appropriate phases of the project from initial ground breaking, to operations, and through closure and decommissioning. The mitigation measures include a combination of the following:

- Measures that have been proposed by the applicant, and that effectively comprise a portion of the proposed action;
- Conditions of Certification (COCs) proposed by the California Energy Commission;
- Regulatory requirements of other federal, state, and local agencies;
- USFWS terms and conditions identified in the Biological Opinion; and
- Additional BLM-proposed mitigation measures and standard right-of-way (ROW) grant terms and conditions.

These requirements are generically referred to as "mitigation measures" throughout this FEIS. Table 4.0-1, in Section 4.0, describes the source of each of these measures, including identification of those that would be required by BLM as conditions of approval in the right of way grant.

1.3 Alternatives to the Proposed Project

Alternatives Identification and Screening

In this analysis of the ISEGS project, 25 alternatives to the ISEGS project have been developed and evaluated. These include nine alternative site locations, a range of different solar and renewable technologies, generation technologies using different fuels, and conservation/demand-side management. Of the 25 alternatives, the only alternatives that were determined to be both feasible and have the potential to result in lesser impacts were:

- Mitigated Ivanpah 3 Alternative
- Modified I-15 Alternative
- No Action Alternative

After a comprehensive evaluation of the nine alternative site locations, only the I-15 and Reduced Acreage alternatives, among the site alternatives, were found to have a potential to avoid or minimize adverse effects on the human environment. These two alternatives were retained for more detailed analysis in Section 4, the Environmental Consequences chapter.

Alternative solar thermal technologies (parabolic trough, Stirling dish, utility scale solar photovoltaics, and linear Fresnel) were considered. As with the proposed distributed power tower technology, these technologies would not substantially reduce visual impacts or biological resources impacts, though land requirements vary among the

technologies. Rooftop solar photovoltaic (PV) facilities would likewise require extensive acreage, although rooftop PV could minimize the need for undisturbed open space. However, increased deployment of rooftop solar PV faces challenges in manufacturing capacity, cost, and policy implementation. Finally, these alternative solar technologies were not the subject of the application received by the BLM. Although reasonable alternatives to the proposed action may include those that are practicable or feasible from a technical and economic standpoint, rather than simply desirable from the applicant's perspective, it is not within the FLPMA authority granted to BLM to direct a project applicant to the specific type of technology or system of energy development on the public lands. For BLM to dictate a project applicant's business model, and hence its technical or economic feasibility, is highly irregular. However, for NEPA purposes, these alternative technologies were identified but eliminated from full analysis as explained in the body of the text in the FEIS.

Other generation technologies (wind, geothermal, biomass, tidal, wave, natural gas, and nuclear) were also examined as possible alternatives to the proposed solar project. These technologies would either be infeasible at the scale of the ISEGS project, or would not eliminate adverse impacts caused by the ISEGS project without creating their own adverse impacts in other locations. A natural gas plant would contribute to greenhouse gas emissions and would not meet the project's renewable generation objective. Construction of new nuclear power plants is currently prohibited under California law. In addition, these alternatives would not meet the purpose and need for the project, are not reasonable, and many are not within the decision space of the BLM. For instance, tidal and wave energy sources are not within the types of energy sources found on public lands. These alternative energy technologies were eliminated from full discussion in the EIS as noted therein.

Conservation and demand side management programs would likely not meet the state's growing electricity needs that could be served by the ISEGS project. In addition, these programs would not provide the renewable energy required to meet the California Renewable Portfolio Standard requirements.

Mitigated Ivanpah 3 Alternative

- In support of the analysis of a reduced acreage alternative, BrightSource (the applicant) submitted a Biological Mitigation Proposal, also referred to as the "Mitigated Ivanpah 3" proposal, on February 11, 2010 (BSE 2010a). The Mitigated Ivanpah 3 proposal was presented for consideration to BLM as an alternative to the proposed project. The Mitigated Ivanpah 3 proposal seeks to address the impacts identified in the DEIS by proposing a facility with the following characteristics:
- Using the same concentrating solar power technology as in the proposed project;
- Reducing the number and modifying the arrangement of heliostats and power towers, thus reducing the overall acreage requested for the ROW authorization;
- Proposing the revised arrangement of heliostats and power towers in a manner that avoids the northern portion of the Ivanpah 3 Unit, and thus reduces the

identified impacts associated with special-status plants, desert tortoises, Visual Resources, and Soil and Water Resources in that area.

A detailed description of the Mitigated Ivanpah 3 proposal is presented in Section 3, and its potential impacts are evaluated in Section 4. The project revision to propose the Mitigated Ivanpah 3 Alternative would reduce the acreage associated with Ivanpah Unit 3 by moving the northern boundary of the ROW grant approximately 1900 feet south of its location in the proposed project, resulting in a reduction of 433 acres of disturbance in that area, as well as a reduction of 433 acres in the total overall ROW grant. The 433-acre area that would be eliminated from the proposed project alternative would be designated as the Northern Rare Plant Mitigation Area (BSE 2010a). The alternative would also eliminate the need to grade approximately 109 acres within the 377-acre Construction Logistics Area (CLA) area. This area would remain within the ROW grant for the Mitigated Ivanpah 3 Alternative, and 67.5 acres of this area would be used as a Rare Plant Transplantation and Succulent Nursery Area. The alignment of the natural gas pipeline ROW, which would follow the northern boundary of Ivanpah Unit 3 in the proposed project alternative, would be extended to and along the revised northern boundary in the Mitigated Ivanpah 3 Alternative. The remainder of the acreage for the requested ROW grant would remain the same as that for the proposed project. However, other facilities and infrastructure within that footprint, including the boundary between Ivanpah 2 and 3, would be adjusted as needed to allow for construction and operation of the revised project design. The total acreage requested for the ROW for the Mitigated Ivanpah 3 Alternative would be 3564.2 acres.

An evaluation of the environmental impacts of the proposal is presented in Section 4. The Mitigated Ivanpah 3 Alternative would accomplish all of the objectives of the purpose and need, including meeting power demand, as well as federal and state objectives for renewable energy development. It would also achieve almost all of the beneficial impacts of the proposed project, including socioeconomic benefits of increases in employment and fiscal resources, and displacement of greenhouse gas and air pollutant emissions associated with fossil-fueled power plants. While meeting these objectives and providing these beneficial impacts, the direct and cumulative adverse impacts of the Mitigated Ivanpah 3 Alternative would be lower than the proposed project, specifically in the areas of Biological Resources (including DT, and special-status plant species), Soil and Water, Visual Resources, Land Use, and Traffic and Transportation. The reduction in impacts would be accomplished by eliminating the northern 433-acre portion of Ivanpah Unit 3 from the project footprint, eliminating grading of approximately 109 acres within the 377-acre CLA area, and using 67.5 acres of the CLA as a Rare Plant Transplantation and Succulent Nursery Area.

Modified I-15 Alternative

To support the analysis of a Modified I-15 Alternative, the applicant submitted a map showing a proposed reconfiguration of Ivanpah Unit 3 to BLM on March 17, 2010 (BSE 2010b). The Modified I-15 Alternative would use the same technology and configuration of components as the Mitigated Ivanpah 3 Alternative, but would seek to further reduce

impacts to Biological Resources by placing Ivanpah Unit 3 in an area which is reported to have a lower density of those resources.

A detailed description of the Modified I-15 Alternative, which involves a reconfiguration of Ivanpah Unit 3 in a location closer to Interstate 15, is presented in Section 3. The Modified I-15 Alternative would reduce the acreage associated with Ivanpah Unit 3, and in the overall ROW grant, by 433 acres. The alternative would also eliminate the need to grade approximately 109 acres within the 377-acre CLA area. This area would remain within the ROW grant for the Modified I-15 Alternative, and 67.5 acres of this area would be used as a Rare Plant Transplantation and Succulent Nursery Area. The alignment of the natural gas pipeline ROW, which would follow the northern boundary of Ivanpah Unit 3 in the proposed project alternative, would be extended to and along the northern boundary of Ivanpah Unit 2 in the Modified I-15 Alternative. The remainder of the acreage for the requested ROW grant would remain the same as that for the proposed project. However, other facilities and infrastructure within that footprint would be adjusted as needed to allow for construction and operation of the revised project design. The total acreage requested for the ROW for the Modified I-15 Alternative would be 3,564.2 acres.

An evaluation of the environmental impacts of the alternative is presented in Section 4. The Modified I-15 Alternative would also accomplish all of the objectives of the purpose and need, including meeting power demand, as well as federal and state objectives for renewable energy development. It would also achieve almost all of the beneficial impacts of the proposed projects, including socioeconomic benefits of increases in employment and fiscal resources, and displacement of greenhouse gas and air pollutant emissions associated with fossil-fueled power plants. While meeting these objectives and providing these beneficial impacts, the adverse impacts of the Modified I-15 Alternative would be lower than the proposed project in some areas, but would be increased in other areas. With respect to Biological Resources, the Modified I-15 Alternative would likely have a reduced impact on high quality desert tortoise habitat, as a result of avoiding the northern 433-acre portion of Ivanpah Unit 3, as well as reconfiguring Ivanpah Unit 3 in a location which partially overlaps the lower quality habitat adjacent to Interstate 15. By including this lower quality habitat within the reconfigured Ivanpah Unit 3 boundaries, the overall impact of the Modified I-15 Alternative on the desert tortoise is likely to be lower than that of the Mitigated Ivanpah 3 Alternative, and for purposes of analysis in the EIS, the overall impact to desert tortoise habitat was assumed to be less; however, this assumption cannot be confirmed without formal surveys of the reconfigured Ivanpah Unit 3 area.

Impacts of the Modified I-15 Alternative to Visual Resources and potential glare impacts for viewers on Interstate 15 would increase over those of both the proposed project and the Mitigated Ivanpah 3 Alternative, due to the placement of heliostat fields within 1,000 feet of the highway for a distance of 1.8 miles. The Modified I-15 Alternative could also result in an increase in impacts to recreational access as compared to the proposed project and Mitigated Ivanpah 3 Alternative, due to the greater length of existing OHV trails that would be included within the project footprint.

1.4 Public and Agency Coordination

Both the Energy Commission's Environmental Quality Act (CEQA)-equivalent process and the BLM's NEPA process provide opportunities for the public and other agencies to participate and consult in the scoping of the environmental analysis, and in the evaluation of the technical analyses and conclusions of that analysis. The following subsections describe the status of these outreach efforts.

Agency Coordination

California Energy Commission

The Energy Commission has the exclusive authority to certify the construction, modification, and operation of thermal electric power plants 50 megawatts (MW) or larger. The Energy Commission certification is in lieu of any permit required by state, regional, or local agencies and by federal agencies to the extent permitted by federal law (Pub. Resources Code, § 25500). The Energy Commission must review power plant AFCs to assess potential environmental impacts including potential impacts to public health and safety, potential measures to mitigate those impacts (Pub. Resources Code, § 25519), and compliance with applicable governmental laws or standards (Pub. Resources Code, § 25523 (d)). In the development of their Final Staff Assessment, the Energy Commission staff's analyses were prepared in accordance with Public Resources Code, section 25500 et seq.; Title 20, California Code of Regulations, section 1701 et seq.; and CEQA (Pub. Resources Code, § 21000 et seq.).
As discussed above, the DEIS for this proposed project was developed as a joint environmental review document, the FSA/DEIS, under an MOU between the Energy Commission and BLM California State Office. Throughout the environmental review process, BLM and Energy Commission staff have conducted joint technical analysis, and co-authored the FSA/DEIS. Following the completion of the FSA/DEIS, BLM and the Energy Commission's environmental review process was separated, as BLM prepared a stand-alone SDEIS and this FEIS, and the Energy Commission prepared a stand-alone FSA Addendum to evaluate additional project alternatives. Throughout the process subsequent to the publication of the FSA/DEIS, BLM and Energy Commission staff have continued to coordinate through conference calls and the review of each other's documents.

The Energy Commission certification is in lieu of any permit required by state, regional, or local agencies and by federal agencies to the extent permitted by federal law (Pub. Resources Code, § 25500). However, both the Commission and BLM typically seek comments from and work closely with other regulatory agencies that administer laws and regulations that may be applicable to the proposed project.

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (USACE) has jurisdiction to protect water quality and wetland resources under Section 404 of the Clean Water Act. Under that authority, USACE reviews proposed projects to determine whether they may impact such resources, and/or be subject to a Section 404 permit. Throughout the DEIS process, the Energy Commission, BLM, and the applicant have provided information to the

USACE to assist them in making a determination regarding their jurisdiction and need for a Section 404 permit. The USACE rendered a final opinion on May 28, 2009 concluding that the project does not affect waters of the U.S. and thus does not require such a permit.

National Park Service

The National Park Service manages the Mojave National Preserve (MNP), which is located near the proposed project area. Because of the proximity of the MNP, the Park Service has been invited to participate in scoping meetings and public workshops, and has been provided the opportunity review and provide comment on the Preliminary Staff Assessment (PSA) and DEIS.

U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS) has jurisdiction to protect threatened and endangered species under the Endangered Species Act (ESA). Formal consultation with the USFWS under Section 7 of the ESA is required for any federal action that may adversely affect a federally-listed species. The desert tortoise (*Gopherus agassizii*), which occurs in the proposed project area, is a federally-listed threatened species, and therefore formal consultation with the USFWS is required. This consultation has been initiated through the preparation and submittal of a Biological Assessment (BA) which describes the proposed project to the USFWS. Following review of the BA, the USFWS is expected to issue a Biological Opinion (BO) which will specify mitigation measures that must be implemented for the protection of the desert tortoise.

State Water Resources Control Board/Regional Water Quality Control Board

The Lahontan Regional Water Quality Control Board (RWQCB) has the authority to protect both surface water and groundwater resources at the proposed project location. Throughout the EIS process, the Energy Commission, BLM, and the applicant have invited the RWQCB to participate in public scoping and workshops, and have provided information to assist BLM in evaluating the potential impacts and permitting requirements of the proposed project. The RWQCB has responded by providing comments that have been evaluated and incorporated into the EIS analysis. The RWQCB has also made a determination that the proposed project would impact waters of the state, and has specified conditions to satisfy requirements of a dredge and fill permit/waste discharge requirements. These requirements have been included as mitigation measures in Section 4.10.

California Department of Fish and Game

The California Department of Fish and Game (CDFG) has the authority to protect water resources of the state through regulation of modifications to streambeds, under Section 1602 of the Fish and Game Code. The Energy Commission, BLM, and the applicant have provided information to CDFG to assist in their determination of the impacts to streambeds, and identification of permit and mitigation requirements. The applicant filed a Streambed Alteration Agreement with CDFG on June 2, 2009. The requirements of the Streambed Alteration Agreement will be included as a recommended Mitigation Measure.

CDFG also has the authority to regulate potential impacts to species that are protected under the California Endangered Species Act (CESA). On May 22, 2009, the applicant filed an application for authorization for incidental take of the desert tortoise under Section 2081(b) of the CESA. The requirements of the Incidental Take Permit have been included as a recommended Mitigation Measure.

County of San Bernardino

On March 18, 2008, the BLM California Desert District entered into an MOU with the County of San Bernardino to coordinate environmental reviews for renewable energy projects on public land within the County. Under this MOU, BLM invites the County to become a cooperating agency for EISs, and provides opportunities for County staff to review and participate in technical discussions and analyses. For the proposed project, the County has elected to become a cooperating agency. BLM continues to provide the County with project-related documentation for their review and evaluation, and the County has provided guidance for protection of groundwater resources which has been incorporated into Section 4.10 of this document.

Public Coordination

Both the Energy Commission's CEQA-equivalent process and the BLM's NEPA process provide opportunities for public participation in the scoping of the environmental analysis, and in the evaluation of the technical analyses and conclusions of that analysis. For the Energy Commission, this outreach program is primarily facilitated by the Public Adviser's Office (PAO). As part of the coordination of the environmental review process required under the Energy Commission/BLM California MOU, the agencies have jointly held public meetings and workshops which accomplish the public coordination objectives of both agencies. This is an ongoing process that to date has involved the following efforts.

Libraries

The AFC was sent to the main county libraries in San Bernardino, Barstow, Fresno, and Eureka; the main branches of the San Diego and San Francisco public libraries; the University Research Library at UCLA; the California State Library, and the Energy Commission's library in Sacramento.

Outreach Efforts

BLM solicited interested members of the public and agencies through the NEPA scoping process. BLM published a Notice of Intent to develop the EIS and amend the CDCA Plan in the Federal Register, Vol. 72, No. 214, page 62671, on November 6, 2007. The initial Public Scoping meeting was held on January 4, 2008, and coincided with the Informational Hearing held by the Energy Commission. On January 9, 2009, BLM published notice of an extension of the public scoping period, and an additional joint public scoping meeting was held on January 25, 2008.
Following the scoping period, the Energy Commission and BLM held additional joint Issue Resolution workshops which were announced and made available to the public. These workshops were held on June 23, 2008 in Primm, Nevada, and on July 31 and

December 15, 2009 in Sacramento, California. The Energy Commission continued to accept and consider public comments, and granted petitions to intervene to eight interested groups including Defenders of Wildlife, Sierra Club, Basin and Range Watch, and Center for Biological Diversity (June 2, 2009), California Native Plant Society, Western Watersheds, CURE, and San Bernardino County. Although not officially part of BLM's NEPA process, BLM's NEPA analysis was supported by information received through these activities.

The BLM public participation process included soliciting comments regarding the scope of the analysis from other government agencies, the public, and non-governmental organizations. The persons and organizations which provided scoping comments, and the general issues addressed within their comments, are provided in **Table 2.1**.

Summary of Public Comments on DEIS and Supplemental DEIS

The Notice of Availability of the DEIS was published on November 10, 2009; the 90-day public review and comment period ended on February 11, 2010. During the public comment period, a variety of activities occurred in which BLM received additional information regarding the proposed project and potential alternatives, impacts, and mitigation measures. These activities included:

- Receipt of comments from the public, and other local, state, and federal agencies during the public comment period;
- Public testimony by Energy Commission staff and consultants, BrightSource staff and consultants, and intervenors associated with the Energy Commission certification process for ISEGS;
- Workshops, involving BLM staff and consultants as well as the above groups, to consider and evaluate impact conclusions and mitigation approaches; and
- Submittal of additional technical reports, project design information, impact analyses, and applicant-proposed mitigation measures by BrightSource.

BLM received comments on the DEIS from 37 individuals, groups, and agencies. These comments are summarized in Appendix A-1 of this FEIS. Comments from 20 individuals, groups, and agencies were received on the SDEIS, and these comments are summarized in Appendix A-2 of this FEIS. Both sets of comments included hundreds of comments received both in favor of the project, and in opposition to the project, in the form of mass mailings and e-mails. The summaries in Appendices A-1 and A-2 include a description of how each comment was evaluated and responded to by BLM. Also, where a comment is particularly relevant to the technical discussion in the text of the FEIS (either comments resulting in revision to the FEIS, or comments dissenting from important conclusions of the FEIS), that information has been incorporated into the revisions for the FEIS. Section 9 also provides a discussion of the comments, including both those which resulted in a change to the text in the FEIS, and those which were considered, but did not result in a change. The comments generally addressed the following topics

- The range of alternatives considered and evaluated, and the methodology for evaluating the alternatives;

- The scope of projects considered in the cumulative impacts analysis, and the methodology for conducting that analysis;
- Opposition to the contribution of the project to industrialization of Ivanpah Valley; and
- Specific comments related to impacts to biological resources, the Mojave National Preserve, air traffic, County services, and other resources.

The applicant's Application for Certification to the Energy Commission (CH2M Hill 2007), the Energy Commission's PSA, and the joint BLM/Energy Commission FSA/DEIS are all publicly available on the Energy Commission website at http://www.energy.ca.gov/sitingcases/ivanpah/index.html.

1.5 Environmental Justice

Executive Order 12898, "Federal Actions to address Environmental Justice in Minority Populations and Low-Income Populations," focuses federal attention on the environment and human health conditions of minority communities and calls on federal agencies to achieve environmental justice as part of this mission. The order requires the USEPA and all other federal agencies (as well as state agencies receiving federal funds) to develop strategies to address this issue. The agencies are required to identify and address any disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and/or low-income populations.

The steps recommended to assure compliance with the Executive Order are: (1) outreach and involvement; (2) a screening-level analysis to determine the existence of a minority or low-income population; and (3) if warranted, a detailed examination of the distribution of impacts on segments of the population. BLM has followed each of the above steps for the following 11 sections in the EIS: Air Quality, Hazardous Materials, Land Use, Noise, Public Health and Safety, Socioeconomics and Environmental Justice, Soils and Water, Traffic and Transportation, Transmission Line Safety/Nuisance, Visual Resources, and Waste Management.

According to the Census 2000 data there were 36 people within six miles of the proposed project site which resided within California. Ten of these people (27.8 percent) were classified as minority (see **Figure 4.9-1**). No census blocks within a six-mile radius of the proposed ISEGS site contain minority populations greater than 50 percent. The 2000 Census block data did not identify any California residents living below the designated poverty level within a six-mile radius of the project site.

No minority communities or low income communities are located within or adjacent to the proposed project areas. The proposed action would not impact distinct Native American cultural practices or result in disproportionately high or adverse human health or environmental effects on minority communities.

1.6 Organization of the EIS

The FEIS is organized as follows:

Section 1 – Executive Summary summarizes the EIS.

Section 2 – Introduction discusses the purpose and need for the proposed project, as well as BLM's processes for the CDCA Plan Amendment and the EIS.

Section 3 – Alternatives, Including the Proposed Action, provides a detailed description of the proposed project and those alternatives which have been retained for detailed evaluation. The section also describes BLM's methodology for identifying and screening alternatives, and describes the rationale for elimination of other alternatives from detailed evaluation.

Section 4 – Affected Environment and Environmental Consequences. The environmental and public health and safety analyses of the proposed project are contained in Section 4. They include the following: Air Quality, Greenhouse Gases, Biological Resources, Cultural Resources and Native American Values, Hazardous Materials Management, Land Use, Noise and Vibration, Public Health and Safety, Socioeconomics and Environmental Justice, Soil and Water Resources, Traffic and Transportation, Transmission Line Safety and Nuisance, Visual Resources, Waste Management, , Worker Safety and Fire Protection, Geology, Paleontology and Minerals, Livestock Grazing, Wild Horses and Burros, and Recreation.

Each of these 19 technical area assessments includes a discussion of:

- Detailed project-specific information that is directly relevant to the resource being evaluated;
- Laws and regulations;
- Affected environment;
- Project direct and indirect impacts from construction, operations, and closure and decommissioning impacts;
- Beneficial impacts;
- Impacts of alternatives, including the No Action Alternative;
- Mitigation Measures; and
- Summary

Section 5 – Cumulative Effects, including identification of the past, present, and reasonably foreseeable future projects, and an evaluation of the cumulative impacts resulting from those projects in combination with the proposed project and alternatives.

Section 6 – Other NEPA Considerations provides an evaluation of the irreversible and irretrievable commitment of resources, unavoidable adverse impacts, and growth inducing effects.

Section 7 – General Conditions, which provides the General Conditions of Approval that are proposed for inclusion in the ROW grant.

Section 8 – Summary, which summarizes the results of the environmental analysis, and identifies BLM's preferred alternative.

Section 9 – Public Participation summary

Section 10 – List of Preparers

Section 11 – References

Appendix A provides a summary of public comments received on the DEIS and SDEIS, including BLM's responses to the comments.

Appendix B contains technical resource-specific appendices that provide additional information to support the technical analyses in Section 4.

Appendix C provides additional information developed by the Energy Commission which is not part of BLM's environmental analysis, but describes additional features of the proposed action. This includes the Energy Commission's General Conditions of Certification that are specific to the Energy Commission's certification process. In addition, engineering analyses performed by the Energy Commission are included in Appendix C, and include sections on Facility Design, Power Plant Efficiency, Power Plant Reliability, and Transmission System Engineering.

1.7 Summary of Project Related Impacts

Air Quality

Potential impacts to air quality are summarized as follows:

- The project would not have the potential to exceed Prevention of Significant Deterioration (PSD) emission levels during direct source operation and the facility is not considered a major stationary source with potential to cause adverse air quality impacts. However, without adequate fugitive dust mitigation, the project would have the potential to exceed the General Conformity PM10 applicability threshold during construction and operation, and could cause potential localized exceedances of the PM10 National Ambient Air Quality Standards (NAAQS) during construction and operation. Mitigation measures **AQ-SC1** through **AQ-SC4**, for construction, and **AQ-SC7**, for operation, would reduce the volume of emissions, and thus reduce the potentially adverse, direct impacts and the contribution of the proposed project to indirect and cumulative impacts.
- The project would comply with applicable District Rules and Regulations, including New Source Review requirements, as required by the Mojave Desert Air Quality Management District (MDAQMD) Final Determination of Compliance (FDOC) for the proposed project.
- The project's construction activities would likely contribute to adverse PM10 and ozone impacts. Mitigation measures **AQ-SC1** to **AQ-SC4** would reduce the magnitude of these potential impacts.
- The project's operation would not cause new violations of any NO_2, SO_2, PM2.5 or CO ambient air quality standards, and therefore, the project direct operational NOx, SOx, PM2.5 and CO emission impacts would not be adverse.
- The project's direct and indirect, or secondary emissions contribution to existing violations of the ozone and PM10 ambient air quality standards are likely to be

adverse, unless they are reduced through mitigation. Mitigation measure **AQ-SC7** would mitigate the operating fugitive dust emissions to ensure that the potentially adverse ozone and PM10 impacts are reduced over the life of the project.

Overall, the air quality impacts associated with the Mitigated Ivanpah 3 and Modified I-15 Alternatives would be lower than those associated with the proposed project. Overall project air emissions for both alternatives, as compared to the proposed project, would be reduced due to the reduction in the size of the Ivanpah Unit 3 boiler, and the reduced area of ground disturbance associated with project construction. The re-location of the Ivanpah Unit 3 power block would result in a small increase in one-hour NOx emissions detected at the site boundary. However, these increased emissions would not exceed any of the regulatory thresholds, and would be very limited in duration.

Although the emissions for both alternatives would be lower than those for the proposed project, they would still cause direct, adverse impacts to air quality, and would also contribute, along with other proposed projects in the area, to a cumulative adverse impact on air quality. However, the mitigation measures discussed above would ensure that emissions would not exceed any NEPA or permitting criteria.

Greenhouse Gases

The Ivanpah Solar Electric Generating System project would emit considerably less greenhouse gas (GHG) than existing power plants and most other generation technologies, and thus would contribute to continued improvement of the overall western United States, and specifically California, electricity system GHG emission rate average. The project would lead to a net reduction in GHG emissions across the electricity system that provides energy and capacity to California. Thus, the proposed project would result in a cumulative overall reduction in GHG emissions from the state's power plants, would not worsen current conditions, and would thus not result in adverse impacts.

GHG emissions from construction activities would not be adverse for several reasons. First, the period of construction would be short-term and not ongoing during the life of the project. Additionally, the best practices control measures included in the mitigation measures, such as limiting idling times and requiring, as appropriate, equipment that meets the latest emissions standards, would further minimize greenhouse gas emissions since the use of newer equipment will increase efficiency and reduce GHG emissions and be compatible with low-carbon fuel (e.g., bio-diesel and ethanol) mandates that will likely be part of the ARB regulations to reduce GHG from construction vehicles and equipment. For all these reasons, the short-term emission of greenhouse gases during construction would be sufficiently reduced and would, therefore, not be adverse.

The Ivanpah Solar Electric Generating System project, as a solar project with a nightly shutdown, will operate less than 60% of capacity and is therefore not subject to the requirements of SB 1368 and the Greenhouse Gas Emission Performance Standard.

However, the Ivanpah Solar Electric Generating System project would easily meet the requirements of SB 1368 and the Greenhouse Gas Emission Performance Standard.

Overall, the emission of greenhouse gases associated with the Mitigated Ivanpah 3 and Modified I-15 Alternatives would be lower than those associated with the proposed project, due to the reduction in the size of the Ivanpah Unit 3 boiler, elimination of an emergency generator, and reduced construction duration associated with the alternatives. However, the Mitigated Ivanpah 3 and Modified I-15 Alternatives would also produce less power output, 370 MW versus 400 MW for the proposed project. As a result, the alternatives would not achieve the same level of beneficial impact of the proposed project in displacing emissions associated with fossil fuel-generating plants.

<u>Biological Resources</u>

The proposed project would have direct, adverse impacts to 4,073 acres of desert tortoise habitat, which would require state and federal endangered species "take" authorizations. The tortoises present in the ROW area would be removed and translocated to an area to the west of the project site. In addition to the direct loss of tortoise habitat, the proposed project would also fragment and degrade adjacent habitat, and could promote the spread of invasive plants and desert tortoise predators (ravens). The proposed project would also directly impact breeding and/or foraging habitat for other special-status wildlife species, including burrowing owl, loggerhead shrike, Crissal thrasher, golden eagle, and American badger. The proposed project would also impact vegetation in the 4,073-acre project area, including one species considered sensitive by BLM (the Rusby's desert-mallow). Finally, the proposed project would adversely impact ephemeral drainages through site grading, compaction, and construction of infrastructure within drainage channels. Although the proposed project construction method, Low Impact Development, would be designed to minimize direct impacts to these drainages, it is assumed that all 2,000 ephemeral drainages (198 acres of waters of the state) would be impacted, and would subject to a streambed alteration agreement with the CDFG. For each of these NEPA impacts identified, mitigation measures that have been proposed by the applicant, Energy Commission staff, other state and federal agencies, and BLM have been developed.

In addition to the evaluation of impacts under NEPA, the analysis of biological impacts of the proposed project in the DEIS included an evaluation of impacts to species considered sensitive under CEQA by the Energy Commission, including plant species listed by the California Native Plant Society (CNPS). For these species, the Energy Commission staff proposed additional Conditions of Certification to reduce the identified impacts. Implementation of these additional Conditions of Certification on public lands would require BLM consent.

The Mitigated Ivanpah 3 alternative would reduce surface disturbance impacts by a total of 433 acres. Of this total, 433 acres located along the northern portion of the proposed Ivanpah 3 site would be removed from the project, preserving an area of diverse, relatively undisturbed native habitat that contains few noxious or invasive weeds. The habitat contains numerous ephemeral drainages, adding to the locations diversity. Many of sensitive species, including desert tortoise utilize this area.

The Mitigated Ivanpah 3 Alternative was developed, in part, to reduce the impacts to wildlife and special status species. By reducing the project footprint by approximately 12.5 percent, the Mitigated Ivanpah 3 Alternative would result in a reduction in impacts to wildlife and special status species. Since the 433-acre area that would remain undisturbed is considered of relatively high quality and diverse native habitat, the benefits would be greater than avoidance of comparable acreage in other, lower quality habitat areas. Further, the location and magnitude of the Mitigated Ivanpah 3 Alternative helps retain large-scale ecological processes and migration corridors that are beneficial to wildlife species.

While the impacts from the Mitigated Ivanpah 3 Alternative would be less and would preserve some of the highest quality habitat, there would be long-term impacts to biological resources in comparison with the No Action Alternative.

The reconfiguration of the proposed Ivanpah Unit 3 to a site adjacent to I-15 would likely result in a reduction in overall impacts to biological resources. For desert tortoise, the Modified I-15 Alternative site would be located within an area already impacted by the proximity of the highway. It is estimated that 315 acres of the reconfigured location of Ivanpah Unit 3, equivalent to 25 percent of the Unit, is adversely impacted by the presence of the highway. Habitat is variable, with areas located below 2,750-feet in elevation consisting of lower quality habitat due to terrain (flat topography with fewer washes), lower forage quality, and proximity to the highway. Fewer tortoises and burrows have been reported at the alternative site (Berry 1984, Cashen 2010), although formal surveys have not been conducted. Consequently, the co-location of the Modified I-15 Alternative with the highway, coupled with fewer acres of high quality tortoise habitat, would likely result in fewer impacts to desert tortoise. Further, some of the highest densities of desert tortoise and highest quality habitat in the project area (the proposed Ivanpah Unit 3 site) would be avoided. Overall, impacts from the Modified I-15 Alternative likely would be less than the proposed project, but would remain greater than the No Action Alternative. Formal consultation with the USFWS will be required for desert tortoise impacts.

Reconfiguration of the Ivanpah Unit 3 site to the Modified I-15 Alternative site co-locates major facilities, while avoiding impacts to the northern portion of the proposed project area. As a consequence, movement corridors between mountainous areas north of the project area remain broad and relatively undisturbed. Human activities associated with the project are less likely to adversely impact big game species, including desert bighorn sheep, as well as other species (e.g., birds, bats) associated with mountainous habitats. Co-location would also reduce habitat fragmentation, leaving large portions of higher quality contiguous habitat intact.

Because the Modified I-15 Alternative would result in direct and indirect affects to wildlife species (e.g., vehicle-wildlife collisions, lower habitat quality within the highway easement, noise, artificial lighting), co-location would reduce adverse impacts to biological resources, while avoiding high quality habitat along the northern portion of the project area.

While some of the habitat within the Modified I-15 Alternative is similar in quality to the Ivanpah Unit 3 site, much of the alternative's habitat located below 2,750-feet in

elevation is less diverse and of lower quality than that associated with the proposed project. Although surveys have not been conducted, it is anticipated that there would be fewer acres capable of sustaining rare plant communities, compared to the original Ivanpah Unit 3 site in the proposed project.

The Modified I-15 Alternative was developed, in part, to reduce the impacts to wildlife and special status species by reconfiguring Ivanpah Unit 3 in an area which may have fewer desert tortoises than the location of Ivanpah Unit 3 in the proposed project. The Modified I-15 Alternative likely would reduce impacts to desert tortoise, and also probably to rare plant species, although field surveys would be necessary to confirm this assessment. Big game and other wildlife species would benefit from co-location with the highway, minimizing habitat fragmentation, retaining movement corridors, and avoiding impacts to high quality habitat along the northern portion of the proposed project.

While the impacts from the Modified I-15 Alternative would be less than those associated with the proposed project, there would still be long-term impacts to biological resources in comparison with the No Action Alternative.

Cultural Resources

The proposed project would have no diirect or indirect adverse impacts on known or unknown, National Register of Historic Places (NRHP)-eligible archaeological, ethnographic, or built-environment resources. With the adoption and implementation of mitigation measures **CUL-8** and **CUL-9**, the cumulative effect of the proposed project on the one presently known NRHP-eligible listed resource, the Hoover Dam-to-San Bernardino transmission line (CA-SBR-10315H), would be reduced.

The implementation of mitigation measures **CUL-1** through **CUL-7** and **CUL-10** would require identification and proper management of any resources found during the course of the construction, operation, maintenance, closure, or decommissioning of the project. **CUL-1** through **CUL-7**, and **CUL-10** are intended to facilitate the identification and assessment of previously unknown archaeological resources encountered during construction-related ground disturbance and to mitigate any adverse impacts from the project on any newly found resources assessed as NRHP-eligible. To accomplish this, mitigation measures provide for the hiring of a Cultural Resources Specialist and archaeological monitors, for cultural resources awareness training for construction workers, for the archaeological and Native American monitoring of ground-disturbing activities, in particular situations, for the recovery of data from NRHP-eligible discovered archaeological deposits, for the writing of a technical archaeological report on all archaeological activities and findings, and for the curation of recovered artifacts and other data. When properly implemented and enforced, these mitigation measures would reduce any adverse impacts to previously unknown cultural resources encountered during construction or operation. Additionally, with the adoption and implementation of these mitigation measures, the ISEGS project would be in conformity with all applicable laws and regulations.

Overall, the cultural resource impacts associated with the Mitigated Ivanpah 3 and Modified I-15 Alternatives would be lower than those associated with the proposed project due to the reduced acreage that would be disturbed during construction. For the Modified I-15 Alternative, an area comprising 1,836 acres, which is the reconfigured location of Ivanpah Unit 3, has not had a cultural resources inventory conducted, and could potentially contain resources that would be impacted, and which would not be addressed by the proposed mitigation measures.

Hazardous Materials Management

Hazardous material use, storage, and transportation associated with the proposed project would not pose any direct, indirect, or cumulative adverse impact. The proposed project would be designed, constructed, and operated in compliance with applicable laws and regulations, which would protect the public from risk of exposure to an accidental release of hazardous materials. Mitigation measures would be implemented, as follows. **HAZ-1** ensures that no hazardous material would be used at the facility except as listed in the AFC, unless there is prior approval by the BLM's Authorized Officer. **HAZ-2** ensures that local emergency response services are notified of the amounts and locations of hazardous materials at the facility, **HAZ-3** requires the development of a Safety Management Plan that addresses the delivery of all liquid hazardous materials during the construction, commissioning, and operation of the project would further reduce the risk of any accidental release not specifically addressed by the proposed spill prevention mitigation measures, and further prevent the mixing of incompatible materials that could result in the generation of toxic vapors. Site security during both the construction and operation phases is addressed in **HAZ-4** and **HAZ-5. HAZ-6** ensures that the applicant complies with all Federal laws and regulations, regarding use, management, spills, and reporting of hazardous materials on Federal lands.

Because there is no potential for hazardous materials release to extend beyond the facility boundary, there is also no adverse impact to the environment. For any other potential impacts upon the environment, including vegetation, wildlife, air, soils, and water resulting from hazardous materials usage and disposal at the proposed facility, the reader is referred to Sections 4.1, 4.3, 4.10 and 4.14 of this EIS.

Overall, by following regulatory requirements and mitigation measures, there would be no potential impacts for the proposed project, the Mitigated Ivanpah 3 Alternative, or the Modified I-15 Alternative. Any hazards associated with hazardous materials use would be lower for the Mitigated Ivanpah 3 and Modified I-15 Alternatives than for the proposed project, due to the reduced duration of construction and reduced acreage of operations.

DOE has considered the potential environmental consequences of intentional destructive acts at the Ivanpah facility and concludes that it presents an unlikely target for an act of terrorism or sabotage and has an extremely low probability of attack. DOE notes that the environmental impact of any intentional destructive act that could occur is addressed in the impact analysis of containment incidents for hazardous materials, fire, and transportation accidents contained in Chapter 4.

Land Use

The criteria for evaluating Land Use impacts include an assessment of whether a proposed project will conflict with any applicable land use plan. The key land use plan affecting this project is the BLM's CDCA Plan of 1980, as amended (BLM 1980). In the CDCA Plan, the location of the proposed ISEGS facility includes land that is classified as Multiple-Use Class L (Limited Use). The Plan states that solar power facilities may be allowed within Limited Use areas after NEPA requirements are met. This Environmental Impact Statement acts as the mechanism for complying with those NEPA requirements.

Because solar power facilities are an allowable use of the land as it is classified in the CDCA Plan, the proposed action does not conflict with the Plan. However, the Plan also requires that newly proposed power sites that are not already included within the Plan be added to the Plan through the Plan Amendment process. The ISEGS site is not currently included within the Plan, and therefore a Plan Amendment is required to include the site as a recognized element with the Plan. The proposed Plan Amendment, and the corresponding analysis of the proposed Plan Amendment with respect to the analysis requirements contained within Chapter 7 of the Plan, is provided within Section 2 of this EIS. The amendment decision would occur after publication of the FEIS.

Large portions of the land area for Ivanpah 1, 2, and 3 and the administrative complex/logistics area are located within existing Utility Corridors D and BB. The land area for Ivanpah 3 would cover approximately 60% of the 2-mile width of Corridor D. Although the land area for Ivanpah 1 and 2, and the logistics construction area overlap and would limit much of the available area within Corridor BB, future linear facilities could still be routed through the portions of Corridor BB that are within the temporary construction logistics area that will only be used during the construction phase of the project.

The use of land associated with the ISEGS project would combine with impacts of present and reasonably foreseeable projects to result in a cumulative reduction in available land uses within the Ivanpah Valley area, and in the region.

Overall, the land use impacts associated with the Mitigated Ivanpah 3 and Modified I-15 Alternatives would be lower than those associated with the proposed project due to the reduced acreage that would be removed from other potential land uses.

Noise and Vibration

The proposed project, if built and operated in conformance with the proposed mitigation measures, would comply with all applicable noise and vibration laws and regulations for both operation and construction, and would produce no adverse noise impacts on people within the affected area, directly, indirectly, or cumulatively.

Overall, by following regulatory requirements and proposed mitigation measures, there would be no potential impacts for the proposed project, the Mitigated Ivanpah 3 Alternative, or the Modified I-15 Alternative. Any hazards associated with noise and

vibration would be lower for the Mitigated Ivanpah 3 and Modified I-15 Alternatives than for the proposed project, due to the reduced duration of construction and reduced acreage of operations.

Public Health and Safety

The analysis of potential public health risks associated with construction and operation of the ISEGS has not resulted in the identification of any adverse cancer, short-term, or long-term health effects to any members of the public, including low income and minority populations, from project toxic emissions. The analysis of potential health impacts from the proposed ISEGS uses a highly conservative methodology that accounts for impacts to the most sensitive individuals in a given population, including newborns and infants. According to the results of the health risk assessment, emissions from the ISEGS would not contribute directly or cumulatively to morbidity or mortality in any age or ethnic group residing in the project area.

Overall, by following regulatory requirements and proposed mitigation measures, there would be no potential impacts for the proposed project, the Mitigated Ivanpah 3 Alternative, or the Modified I-15 Alternative. Any potential public health threats would be lower for the Mitigated Ivanpah 3 and Modified I-15 Alternatives than for the proposed project, due to the reduced duration and acreage of construction, reduced overall level of emissions, and reduced duration of decommissioning.

Socioeconomics and Environmental Justice

No adverse socioeconomic impacts would occur as result of the construction or operation of the proposed ISEGS. The proposed ISEGS would not cause an adverse direct, indirect, or cumulative impact on population, employment, housing, public finance, local economies, or public services. The proposed ISEGS would benefit the two-county study area (San Bernardino County, California, and Clark County, Nevada) and the local project vicinity in terms of an increase in local expenditures, payrolls, and taxation during construction and operation of the facility. These activities would have a positive effect on the local and regional economy.

The impacts to socioeconomics for the Mitigated Ivanpah 3 and Modified I-15 Alternatives would be beneficial, due to the increase in local employment and tax revenues. However, the increase in employment would not result in an increase in the local population, so would not affect housing or public services. The beneficial impacts associated with the Mitigated Ivanpah 3 and Modified I-15 Alternatives would be slightly lower than those for the proposed project, due to the reduced duration of construction and decommissioning.

Soil and Water Resources

Construction, operation, and decommissioning of the proposed project could potentially impact soil and water resources. Where these potential impacts have been identified, mitigation measures are required to reduce the potential for their occurrence and their

magnitude. With these mitigation measures implemented, the project would conform with all applicable laws and regulations. Potential impacts to soil and water resources are summarized as follows:

1. The proposed project would be located on an alluvial fan where flash flooding and mass erosion could impact the project. Project-related changes to the alluvial fan hydrology could result in impacts to adjacent land users and the Ivanpah playa. The applicant completed a hydrologic study and modeling of the alluvial fan. Based on this work and subsequent confirmatory and sensitivity modeling conducted by the BLM, scour analyses have been performed to support development of a project design that can withstand flash flood flows with minimal damage to site structures and heliostats. In addition, a Drainage Erosion and Sediment Control Plan (DESCP) has been developed to mitigate the potential storm water and sediment project-related impacts. However, the calculations and assumptions used to evaluate potential storm water and sedimentation impacts are imprecise and have limitations and uncertainties associated with them. Given the uncertainty associated with the calculations, the magnitude of potential impacts that could occur cannot be determined precisely. As discussed in the Biological Resources and Recreation sections, the potential effects associated with storm water and sedimentation impacts could adversely affect habitat for a threatened species (the desert tortoise), as well as recreational use of Ivanpah Playa. Should these impacts occur, they would likely be highly controversial. Based on these factors, the proposed project could result in direct, adverse impacts. Therefore, mitigation measure **Soil&Water-5** that defines monitoring, inspection, and damage response requirements, as well as standards and procedures for re-considering the proposed storm water management approach if needed in the future.
2. The proposed project would use an air-cooled condenser for heat rejection and would recycle process wastewater from all plant equipment, including boilers and water treatment equipment, to the extent practicable. Recycling the wastewater would maximize reuse of process water and conserve freshwater. Use of this technology would substantially reduce water use and is consistent with water policy and the constitutional requirement that State water resources be put to beneficial use to the fullest extent possible.
3. There would be no adverse impacts to groundwater supply and quality. In the Ivanpah Valley Groundwater Basin, two substantial components of the basin's water balance are groundwater recharge through precipitation and groundwater loss through well pumping. Both precipitation and pumping in the basin will vary over the 50-year life of the proposed project. To ensure that the project's proposed use of groundwater does not adversely impact the beneficial uses and users of the groundwater in the basin, the project would become part of the existing groundwater monitoring and reporting program developed by San Bernardino County for the Primm Valley Golf Club. Substantial changes to groundwater levels caused by the proposed project would be documented by this monitoring and reporting program in accordance with mitigation measure **Soil&Water-6**.

Overall, the potential for soil and water impacts associated with the Mitigated Ivanpah 3 Alternative would be either the same as, or reduced from those associated with the

proposed project. Some of these potential impacts, including soil erosion associated with site grading and potential stormwater damage to the facility would be reduced substantially, because of the nature of stormwater drainage on the 433-acre northern portion of Ivanpah Unit 3 that would be eliminated. The Mitigated Ivanpah 3 Alternative would also use a reduced amount of groundwater for washing of heliostats, and would therefore reduce potential groundwater use conflicts.

The potential impacts of the Modified I-15 Alternative on soil erosion due to grading, Waters of the State, and stormwater damage to facility infrastructure cannot be fully evaluated at this time, because complete drainage channel mapping and stormwater modeling of the revised Ivanpah Unit 3 location has not been performed. However, based on a preliminary evaluation of the existing drainage mapping, stormwater modeling, and topographic maps of the area, it is likely that the soil and water impacts associated with the Modified I-15 Alternative would be either similar to or lower than those of the proposed project. The Modified I-15 Alternative would also use a reduced amount of groundwater for washing of heliostats, and would therefore reduce potential groundwater use conflicts.

Traffic and Transportation

The proposed project's potential construction and operational impacts related to the regional and local traffic and transportation system are summarized as follows:

1. During construction, project-related construction traffic would not result in an unacceptable level of service along study area roadway segments or intersections, and therefore no adverse impacts would be created by workforce traffic and truck traffic. The project would exacerbate existing congestion on I-15 on Friday afternoons in the area of Yates Well Road, resulting in an adverse impact at that time. To reduce the proposed project's construction- and operation-related contribution to congestion on northbound I-15 on Friday afternoons, mitigation measure **TRANS-1** would require a Traffic Control Plan.
2. During construction, the project would substantially increase the volume of traffic on roadways and intersections in the vicinity of recreation resources. Therefore, mitigation measure **TRANS-1** requires adequate signage along local roads and intersections to alert travelers to the presence of construction vehicles.
3. Because proposed project construction traffic has the potential to result in unexpected damage to Yates Well Road and I-15 freeway ramps, mitigation measure **TRANS-2** is required to ensure that any damage to local roadways would be repaired to pre-project levels to not present a safety hazard to motorists.
4. Saturday through Thursday during operation, workforce and truck traffic to and from the facility would not result in a substantial increase in congestion, deterioration of the existing level of service, or creation of a traffic hazard during any time in the daily traffic cycle and would therefore not have a direct, adverse impact on routes or roadway intersections that would be used to access the ISEGS site.
5. Solar radiation and light reflected from proposed project heliostats could cause a human health and safety hazard to observers in vehicles on adjacent roadways or

air traffic flying above the site, and could cause a distraction of drivers on I-15 that would lead to road hazards and to pilots of aircraft flying over the site. Mitigation measure **TRANS-3** would ensure that solar radiation and light from the heliostats does not impair the vision of motorists or pilots traveling near the site and that the potential for exposure of observers does not cause a human health and safety hazard.

6. Solar radiation and light reflected from proposed project power tower receivers is not expected to pose a human health and safety hazard to navigation of vehicles on adjacent roadways or air traffic flying above the site, but could potentially cause a distraction of drivers on I-15 that would lead to road hazards. Mitigation measure **TRANS-4** would ensure that glare from power tower receivers does not impair the view of motorists or pilots traveling near the site and that the potential for exposure of observers to light reflected from heliostats is minimized to the extent possible.
7. Because the proposed project would result in construction of structures greater than 200 feet tall in the vicinity of a proposed airport and existing military training flight route, mitigation measure **TRANS-5** is required to ensure that onsite power towers are lighted in accordance with FAA recommendations. The project would not adversely affect aircraft operations associated with any aircraft flight traffic.
8. The construction and operation of the ISEGS as proposed, with the effective implementation of mitigation measures, would ensure that the project's direct adverse traffic and transportation impacts would be avoided or reduced in magnitude.
9. Vehicle trips generated by construction and operation of the ISEGS would combine with vehicle trips generated by past, present and reasonably foreseeable projects to contribute to the existing adverse, cumulative impact of congestion on northbound I-15 on Friday afternoons.
10. With the implementation of the traffic control plan required by mitigation measure **TRANS-1**, construction and operation of the ISEGS would not cause a direct adverse impact on northbound I-15 on Friday afternoons, but would contribute to an existing cumulative adverse impact on northbound I-15 on Friday afternoons.
11. During project operation, heat exhaust from the Ivanpah 3 air cooled condenser would result in thermal plumes that would result in the potential for aircraft to experience turbulence at an altitude of 1,350 feet or less. Therefore, mitigation measure **TRANS-6** is required to ensure that thermal plumes associated with ISEGS operation do not impact aviation activities within the navigable airspace above the site.

Because the employment levels, and therefore commuting trips by workers, would be the same for the proposed project, Mitigated Ivanpah 3 Alternative, and Modified I-15 Alternative, the direct adverse impact, and contribution to cumulative adverse impacts, on Interstate 15 on Friday afternoons would be the same for each alternative. The primary difference in traffic impacts would be that the impacts associated with construction and decommissioning of the Mitigated Ivanpah 3 and Modified I-15 Alternatives would occur for a shorter duration than for the proposed project.

Transmission Line Safety and Nuisance

The proposed transmission lines are not expected to pose an aviation hazard according to current FAA criteria, and therefore it is not necessary to recommend location changes on the basis of a potential hazard to area aviation.

The potential for nuisance shocks would be minimized through grounding and other field-reducing measures that would be implemented in keeping with current SCE guidelines (reflecting standard industry practices). These field-reducing measures would maintain the generated fields within levels not associated with radio-frequency interference or audible noise.

The potential for hazardous shocks would be minimized through compliance with the height and clearance requirements of CPUC's General Order 95. Compliance with Title 14, California Code of Regulations, section 1250, would minimize fire hazards while the use of low-corona line design, together with appropriate corona-minimizing construction practices, would minimize the potential for corona noise and its related interference with radio-frequency communication in the area around the route.

Since electric or magnetic field health effects have neither been established nor ruled out for the proposed ISEGS and similar transmission lines, the public health impacts of any related field exposures cannot be characterized with certainty. The only conclusion to be reached with certainty is that the proposed lines' design and operational plan would be adequate to ensure that the generated electric and magnetic fields are managed to an extent the CPUC considers appropriate in light of the available health effects information. The long-term, mostly residential magnetic exposure of health concern in recent years would not be an issue for the proposed line given the absence of residences along the proposed route. On-site worker or public exposure would be short term and at levels expected for Southern California Edison (SCE) lines of similar design and current-carrying capacity. Such exposure is well understood and has not been established as posing a substantial human health hazard.

Since the proposed project line would be operated to minimize the health, safety, and nuisance impacts of concern, and would remain in its present route without nearby residences, the proposed design, maintenance, and construction plan would comply with the applicable laws. With implementation of the mitigation measures proposed above, direct or indirect adverse impacts would not occur.

Because the transmission lines would be the same under the proposed project, the Mitigated Ivanpah 3 Alternative, and the Modified I-15 Alternative, the potential impacts would be the same for all three alternatives. However, in each case, the potential for adverse impacts would be minimized by compliance with regulations and industry standards for operation of transmission lines.

Visual Resources

The proposed project would result in a direct adverse impact to existing scenic resource values as seen from several Key Observation Points in the Ivanpah Valley and Clark Mountains, including:

- The Primm Valley Golf Course;
- Middle-ground-distance viewpoints on Highway I-15;
- Viewpoints in the Mojave National Preserve, throughout the east face of Clark; and Mountain
- Viewpoints in the Stateline Wilderness Area, including the Umberci Mine and vicinity.

The visual impacts associated with the project would be viewed by visitors to the Mojave National Preserve and two designated wilderness areas, and a land-sailing site of regional or greater importance. The potential effects involve the unique scenic characteristics of the local landscape as indicated by the national park and wilderness designations of portions of the project viewshed; concerns expressed by public commentors to date; and a degree of uncertainty as to the level of discomfort or disability glare from the solar tower receivers.

Some of the adverse visual impacts, such as those associated with the Primm Valley Golf Course (KOPs 1 and 2), could be reduced through implementation of mitigation measures. However, potentially adverse visual impacts at the other locations cited above could not be reduced through mitigation, and would thus result in unavoidable adverse impacts.

Because the project has the potential to result in exposure of aircraft pilots, motorists, and hikers to solar radiation reflected from project heliostats and/or power tower receivers, mitigation measures **TRANS-3** and **TRANS-4** would ensure that potential glare from the project is minimized to the extent possible and does not pose a health and safety risk. The solar receiver units atop the solar power towers would generate conspicuously bright levels of glare for foreground viewers. Even with mitigation measures, glare, while not representing a hazard, could represent a visually dominant feature as seen from the viewpoints named above. Remaining glare could alter the character of views of Clark Mountain from the valley floor, affecting the public's ability to enjoy those views, though not preventing them.

The project, in combination with foreseeable future projects, could also result in adverse and unavoidable cumulative visual impacts of two kinds:

1. Cumulative impacts within the immediate project viewshed, essentially comprising foreseeable future projects in the Ivanpah Valley; and
2. Cumulative impacts of foreseeable future solar and other renewable energy projects within the southern California Mojave Desert.

The analysis establishes that the proposed project would represent a substantial change and impairment of a natural landscape that is largely intact. However, within an urban frame of reference, not all viewers would find the project disagreeable or unattractive; indeed, many viewers could find the project interesting to view due to its novelty. Overall, it would exhibit a moderate level of visual quality and would leave scenic views of Clark Mountain unobstructed physically, though strongly impaired by glare. Within an urban frame of reference, where preservation of natural landscapes is not a primary goal, this level of impact might be considered acceptable.

This fact may be relevant within the context of the cumulative impact scenario foreseen within the Ivanpah Valley, since development of any of the proposed renewable energy projects, or a preponderance of other foreseeable projects, would result in such an urbanized setting. If a number of the foreseeable cumulative projects are developed, the Ivanpah Valley landscape would, with or without the ISEGS project, quickly reach a point at which the level of scenic intactness is impaired to a *de facto* VR Class IV, low visual quality and sensitivity condition, becoming an urbanized environment, in apparent conflict with the area's Multiple-Use Class L status under the CDCA Plan and the County of San Bernardino's scenic highway policies.

As stated previously, the project would result in unavoidable adverse impacts. However, mitigation measures would minimize impacts to the greatest feasible extent.

Overall, the Mitigated Ivanpah 3 Alternative would have the same adverse impacts that would be associated with the proposed project. However, the magnitude of these impacts would be reduced due to the reduction in the number of power tower receivers, the reduction of the size of the heliostats fields, and the movement of the northern boundary of the facility further from sensitive viewing locations.

The Modified I-15 Alternative would also have the same type of adverse impacts that would be associated with the proposed project. To viewers located in the Mojave National Preserve and Stateline Wilderness to the west and north of the facility, the magnitude of these impacts would be reduced due to the reduction in the number of power tower receivers, the reduction of the size of the heliostats fields, and the reconfiguration of Ivanpah Unit 3. However, the reconfiguration of Ivanpah Unit 3 four miles to the south, to a location directly adjacent to Interstate 15, would increase the magnitude of visual impacts to viewers on Interstate 15.

Waste Management

Project wastes would be managed in compliance with all applicable waste management laws and regulations. Both construction and operation wastes would be characterized and managed as either hazardous or non-hazardous waste. All non-hazardous wastes would be recycled to the extent feasible, and nonrecyclable wastes would be collected by a licensed hauler and disposed of at a permitted solid waste disposal facility. Hazardous wastes would be accumulated onsite in accordance with accumulation time limits and then properly manifested, transported to, and disposed of at a permitted hazardous waste management facility by licensed hazardous waste collection and disposal companies. Management of the waste generated during construction and operation of the ISEGS would not result in any direct or cumulative adverse impacts, and would comply with applicable laws and regulations, if the waste management practices and mitigation measures are implemented.

Mitigation measures **WASTE-1** through **WASTE-7** would help ensure and facilitate ongoing project compliance with laws and regulations. These measures would require the project owner to do all of the following:

- Prepare Construction Waste Management and Operation Waste Management Plans detailing the types and volumes of wastes to be generated and how

wastes will be managed, recycled, and/or disposed of after generation (**WASTE-3** and **6**).

- Obtain a hazardous waste generator identification number (**WASTE-4**).
- Ensure the project site is investigated and any contamination identified is remediated as necessary, with appropriate professional and regulatory agency oversight (**WASTE-1, 2, and 7**).
- Report any waste management-related laws and regulations enforcement actions and how violations will be corrected (**WASTE-5**).
- Ensure that all spills or releases of hazardous substances are reported and cleaned-up in accordance with all applicable federal, state, and local requirements (**WASTE-7**).

The existing available capacity for the Class III landfills that may be used to manage nonhazardous project wastes exceeds 1 billion cubic yards. The total amount of nonhazardous wastes generated from construction and operation of ISEGS would contribute less than 0.1 percent of the remaining landfill capacity. Therefore, disposal of project generated non-hazardous wastes would not have an adverse impact on Class III landfill capacity.

In addition, the Class I disposal facilities that could be used for hazardous wastes generated by the construction and operation of ISEGS have a remaining capacity in excess of 68 million cubic yards (Campbell 2008). The total amount of hazardous wastes generated by the ISEGS would contribute less than 0.02 percent of the remaining permitted capacity. Therefore, impacts from disposal of ISEGS generated hazardous wastes would not have an adverse impact on the remaining capacity at Class I landfills.

Overall, by following regulatory requirements and mitigation measures, there would be no potential adverse impacts for the proposed project, the Mitigated Ivanpah 3 Alternative, or the Modified I-15 Alternative. Any hazards associated with waste generation and management would be lower for the Mitigated Ivanpah 3 and Modified I-15 Alternatives than for the proposed project, due to the reduced duration of construction, and reduced volume of materials requiring demolition.

<u>**Worker Safety and Fire Protection**</u>

By implementing the described construction safety and health and project operations and maintenance safety and health programs, as required by mitigation measures **WORKER SAFETY -1**, and **-2**; and fulfilling the requirements of mitigation measures **WORKER SAFETY-3** through**-6**, the proposed project would incorporate sufficient measures to ensure adequate levels of industrial safety and comply with applicable laws and regulations. Information initially received from the San Bernardino County Fire Department (SBCFD) indicated that the proposed project would not have adverse impacts on local fire protection and emergency response services. However, the County has provided additional information, in the form of comments on the DEIS, indicating that such an adverse impact may exist. In an attempt to rectify the

contradictory information provided by the SBCFD, BLM submitted a letter to the County requesting additional information on the specific impacts, and the County's financial estimate. As of the time of publication of this FEIS, the requested information has not been received. Although such impacts to County services may occur, neither BLM nor the County has a legal mechanism in place to require the applicant to provide funding to the County to address this impact.

Overall, by following regulatory requirements and proposed mitigation measures, there would be no potential impacts for the proposed project, the Mitigated Ivanpah 3 Alternative, or the Modified I-15 Alternative. Any hazards associated with worker safety would be lower for the Mitigated Ivanpah 3 and Modified I-15 Alternatives than for the proposed project, due to the reduced duration of construction, and reduced volume of materials requiring demolition. The risk of wildfire damage to the facility would be the same for the Mitigated Ivanpah 3 Alternative and the proposed project.

<u>Geology, Paleontology, and Minerals</u>

The proposed ISEGS site is located in a moderately active geologic area on the west side of Ivanpah Valley, east of the Clark Mountain Range in the eastern Mojave Desert of Southern California. The main geologic hazards at this site include ground shaking; liquefaction; settlement due to compressible soils, subsidence associated with shrinkage of clay soils, hydrocompaction, or dynamic compaction; and the presence of expansive clay soils. The applicant would comply with state requirements regarding facility design by incorporating recommendations contained in a design-level geotechnical report as required by the California Building Code (2007). In addition, the applicant would comply with Energy Commission Conditions of Certification **GEN-1, GEN-5,** and **CIVIL-1** (provided in **Appendix C - Facility Design**), which were recommended by Energy Commission staff in their FSA to eliminate or reduce the magnitude of these potential impacts. The design and construction of the project should have no adverse impact with respect to geologic, mineralogical, and paleontological resources.

The proposed project area is currently not used for mineral production, nor is it under claim, lease, or permit for the production of locatable, leasable, or salable minerals. Sand and gravel resources are present at the site and could potentially be a source of salable resources; however, such materials are present throughout the regional area such that the ISEGS should not have an adverse impact on the availability of such resources.

Paleontological resources have been documented within 45 miles of the project, but no fossils were found during field explorations on the solar plant sites or near the sub-station and ancillary facilities; however, pack rat middens with plant remains were found in the carbonate bedrock outcrop west of Ivanpah 3. If encountered, potential impacts to paleontological resources contained in these materials due to construction activities would be mitigated through worker training and monitoring by qualified paleontologists, as outlined in mitigation measures **PAL-1** through **PAL-7**.

Overall, the paleontological resource impacts associated with the Mitigated Ivanpah 3 Alternative would be lower than those associated with the proposed project due to the reduced acreage that would be disturbed during construction. Although the acreage would be reduced by approximately 12.5 percent, the potentially impacted area would be reduced by more than 12.5 percent, because the 433-acre area eliminated from the alternative would require extensive grading in the proposed project. Impacts on leasable and locatable mineral resources would be the same or lower for the Mitigated Ivanpah 3 Alternative than the proposed project. No hazards to either the proposed project or Mitigated Ivanpah 3 Alternative from geologic conditions would be expected.

The paleontological resource impacts associated with the Modified I-15 Alternative would also be lower than those associated with the proposed project due to the reduced acreage that would be disturbed during construction. Although the resources within the revised Ivanpah Unit 3 location have not been inventoried, they are likely to be similar to those identified and evaluated for the proposed project. Impacts on leasable and locatable mineral resources would be the same or lower for the Modified I-15 Alternative than the proposed project. No hazards to either the proposed project or Modified I-15 Alternative from geologic conditions would be expected.

Livestock Grazing

The issue of cattle grazing and grazing administration is directly applicable to the proposed project because the public lands associated with the proposed project are within an active grazing allotment. Because the proposed project would involve removal of vegetation and fencing off of the entire property, approval of the proposed project would require modifying the allotment boundaries, resulting in a minor reduction in allotment size of 4 percent. Administratively, this modification can be accomplished through BLM administrative procedures. In addition, increased traffic associated with construction and operation of the proposed project are not expected to cause injury of death to individual cattle through vehicle strikes because the livestock may well avoid the area in its entirety because of the human activities that would occur on the site. The impact would result in modification of the allotment boundaries, resulting in a minor 4 percent reduction in allotment acreage which is not considered a substantial adverse impact to foraging opportunities or to the safety of livestock.

The No Action Alternative would not have any impact on the characteristics or administration of the allotment.

The impact of the Mitigated Ivanpah 3 and Modified I-15 Alternatives on the existing Clark Mountain Grazing Lease would be direct and adverse, but would be lower than that associated with the proposed project. Any hazards associated with vehicle and equipment use in active cattle grazing areas when cattle are present would be the same for both alternatives, and would be mitigated through the use of speed limits and worker notifications.

Wild Horses and Burros

The issue of burros is directly applicable to the proposed project because the public lands associated with the proposed project coincides with a designated HMA, and because burros are known to exist in the vicinity of the proposed project location. Because the proposed project would involve removal of vegetation and fencing of the entire 3,712 acre property that would be permanently disturbed, approval of the proposed project would eliminate a small portion of the land area available for the existing burros. In addition, increased traffic associated with construction and operation of the proposed project could potentially cause injury or death to individual burros through vehicle strikes. Individual burros could also be injured or killed if they were to fall into excavations associated with project construction activities, or be fed and watered by humans in the immediate vicinity of the project footprint.

The Northern and Eastern Mojave (NEMO) Plan Amendments have established the AML in the vicinity of the proposed project area at zero, meaning BLM is actively involved in removing all burros within the area. In addition, the mitigation measures would avoid injury to burros while they may still be present in the project area or vicinity.

The No Action Alternative would not have any impact on the characteristics or administration of the burros.

Neither the proposed project, the Mitigated Ivanpah 3 Alternative, nor the Modified I-15 Alternative would have an adverse impact on wild horses or burros in the project area. Any hazards to individual burros associated with vehicle and equipment use would be the same for all three alternatives, and would be mitigated through the use of speed limits and worker notifications.

Recreation

The proposed project location itself is not specifically permitted, used, or designated for any recreational activity. The proposed location represents a small portion of the overall area available for recreation in the Mojave Desert, and although the proposed project would require re-direction of access roads to recreation areas, the magnitude of this re-direction is expected to be small. However, the issue of recreational resources is still directly applicable to the proposed project because part of the attraction of the area, historically, has been driven by easy vehicular access to an unspoiled desert viewscape. The presence of the proposed facility would likely attract some tourists who are interested in unusual and large-scale industrial operations. While the impact on the quality of outdoor recreational experience would diminish the experience of campers, hikers, hunters, and some other recreational users, it would not likely affect the larger number of local tourists which include golfers, land sailors, and visitors to the Primm casinos.

The impacts related to changes in the viewscape, contributing to the transformation of a mostly natural to a more industrial setting, would be long-term, even though the land could be potentially restored and the associated viewscape as affected by the project could be repaired following facility decommissioning.

The project could potentially impact land sailing on the Ivanpah Dry Lake surface if it were to modify stormwater and sedimentation characteristics or result in hazardous materials, waste or debris being transported to the Dry Lake. Mitigation measures in Sections 4.5, 4.10, and 4.14 would mitigate these impacts by reducing the potential for their occurrence, and by requiring monitoring and response to any identified impacts. Also, the project would not notably modify wind characteristics, or impose a visual glare hazard that would affect the health and safety of land sailors.

The No Action Alternative would not have any impact on the characteristics or administration of recreational resources.

Overall, no direct or indirect impacts on recreational use of the project area, Dry Lake bed, and surrounding areas would be expected from the proposed project, the Mitigated Ivanpah 3 Alternative, or the Modified I-15 Alternative. All three alternatives would likely provide a beneficial impact on tourism by attracting persons interested in the unusual and large-scale character of the facility. However, all three alternatives would also contribute incrementally to an increase in the industrial character of the area, which would likely result in reducing the quality of the recreational experience for many recreational users of the area.

1.8 Summary

Although the proposed project would achieve all project objectives, and generate the maximum amount of beneficial socioeconomic, greenhouse gas, and air pollutant impacts, it would also result in the greatest number and magnitude of adverse impacts. These would include impacts to Biological Resources, Soil and Water Resources, and Visual Resources that could not be completely mitigated.

Selection of the Mitigated Ivanpah 3 Alternative would accomplish all of the objectives of the purpose and need, including meeting power demand, as well as federal and state objectives for renewable energy development. It would also achieve almost all of the beneficial impacts of the proposed project, including socioeconomic benefits of increases in employment and fiscal resources, and displacement of greenhouse gas and air pollutant emissions associated with fossil-fueled power plants. While meeting these objectives and providing these beneficial impacts, the adverse impacts of the Mitigated Ivanpah 3 Alternative would be much lower than the proposed project, especially in the areas of Biological Resources, Soil and Water Resources, and Visual Resources.

Selection of the Modified I-15 Alternative would also accomplish all of the objectives of the purpose and need, including meeting power demand, as well as federal and state objectives for renewable energy development. It would also achieve almost all of the beneficial impacts of the proposed projects, including socioeconomic benefits of increases in employment and fiscal resources, and displacement of greenhouse gas and air pollutant emissions associated with fossil-fueled power plants. While meeting these objectives and providing these beneficial impacts, the adverse impacts of the Modified I-15 Alternative would be lower than the proposed project in some areas, but would be increased in other areas. With respect to Biological Resources, the Modified I-15 Alternative would have a reduced impact on high quality desert tortoise habitat, as

a result of moving Ivanpah Unit 3 to a location which partially overlaps the lower quality habitat adjacent to Interstate 15. However, impacts to Visual Resources and potential glare impacts for viewers on Interstate 15 would increase, due to the placement of heliostat fields within 1,000 feet of the highway for a distance of 1.8 miles. The Modified I-15 Alternative could also result in an increase in impacts to recreational access as compared to the proposed project, due to the greater length of existing off-highway vehicle (OHV) trails that would be included within the project footprint.

Most of the impacts associated with the Mitigated Ivanpah 3 and Modified I-15 Alternatives would be very similar to each other, based on the similar size, technology, and configuration of the facility. The only physical difference between the two alternatives would be the location of Ivanpah Unit 3, which would border the northern portion of the facility in the Mitigated Ivanpah 3 Alternative, and the southern portion of the facility in the Modified I-15 Alternative. This difference in location results in potentially different impacts to several resources, as follows:

- Biological Resources

  The difference in location has the potential to impact different habitat, wildlife, and plants in the two different locations. The northern location of Ivanpah Unit 3 in the Mitigated Ivanpah 3 Alternative is likely to have a higher density of tortoises and rare plants, and therefore a higher potential for impacts, than the southern location of Ivanpah Unit 3 in the Modified I-15 Alternative.

- Land Use

  Both the Mitigated Ivanpah 3 and Modified I-15 Alternatives would partially occupy designated utility corridors; however, the corridors involved are different from each other. Under the Mitigated Ivanpah 3 Alternative, Ivanpah Unit 3 would occupy a portion of utility corridor D, while Ivanpah unit 3 in the Modified I-15 Alternative would partially occupy corridor B. In both cases, portions of the corridors would remain available for other uses.

- Soil and Water

  Based on a review of topographic information and stormwater modeling that covers a portion of the Modified I-15 site, it is likely that the position of the Modified I-15 site is similar to, or possibly slightly more favorable than, the Mitigated Ivanpah 3 site with respect to potential stormwater damage.

- Traffic and Transportation

  The potential issue of distraction to drivers on Interstate 15 due to glare from the heliostats and power tower receivers cannot be quantified, and is difficult to predict. If this issue should occur, it would likely be more disruptive at the Modified I-15 location than the Mitigated Ivanpah 3 location, due to the closer proximity of the heliostats and power towers to Interstate 15.

- Visual Resources

  With respect to the position of viewers located on Clark Mountain or the Stateline Wilderness to the north and west of the facility, visual impacts associated with

the Modified I-15 Alternative would be lower than those for the Mitigated Ivanpah 3 Alternative. This would be due to the more distal location of Ivanpah Unit 3 in the Modified I-15 Alternative. For the same reason, visual impacts to viewers on Interstate 15 would be higher for the Modified I-15 Alternative, due to the situation of Ivanpah Unit 3 within 1,000 feet of the highway, for a distance of approximately 1.8 miles.

- Recreation

  Both the Mitigated Ivanpah 3 Alternative and the Modified I-15 Alternative would occupy land that currently includes designated OHV trails used for recreation. In both cases, the trails would be re-routed around the outside of the facilities. The length of trails that would be affected would be 8,100 feet (1.5 miles) for the Mitigated Ivanpah 3 Alternative, and 12,270 feet (2.4 miles) for the Modified I-15 Alternative.

Although it would have no adverse impacts, the No Action Alternative would not accomplish project objectives of meeting the demand for power, or contribute to meeting state and federal objectives for renewable energy development. It also would not provide the beneficial impacts associated with the proposed project and Mitigated Ivanpah 3 Alternative, including the socioeconomic benefits. By not contributing to the development of renewable energy, the No Action Alternative would cause the state to continue to rely on fossil-fueled energy sources, with the associated greenhouse gas and air pollutant emissions.

Public comments received on the Supplemental DEIS included additional information and opinions regarding the relative merits of the four alternatives. A detailed discussion of these comments is provided in Appendix A-2. The following summarizes the major points of the comments with respect to the selection of a preferred alternative:

- Many commentors, including the applicant, public officials, labor unions, and individuals favor the proposed project because it would meet the growing electricity needs of the region, would generate that power without releasing greenhouse gases, and would provide jobs. However, numerous other commentors, including environmental organizations and individuals, either oppose the proposed project, or desire that it be modified, due to the adverse impacts that the project would have on biological resources, visual resources, recreation, air quality, and land uses.

- The applicant and individuals provided comments in support of the Mitigated Ivanpah 3 Alternative. These comments supported this alternative for the reasons cited for the proposed project above, as well as the fact that the alternative would result in a reduction of adverse impacts to biological resources. Several of the environmental organizations and individuals who were opposed to the proposed project also opposed the Mitigated Ivanpah 3 Alternative, primarily because they felt that the reduction in adverse impacts associated with this alternative was not as great as could be achieved through the Modified I-15 Alternative.

- The Modified I-15 Alternative was supported by several environmental organizations, including the Sierra Club, primarily because placement of the facility closer to I-15 would minimize adverse impacts to biological resources. The applicant opposed the Modified I-15 Alternative for several technical and impact-related reasons. In their comments on the Supplemental DEIS, the applicant noted that the Modified I-15 Alternative would not be economically feasible for them to implement, due to the length of time that would be needed to re-design and re-configure the engineering design for the project. The applicant also cited increased visual impacts in their opposition to the Modified I-15 Alternative.
- Numerous commentors, including environmental organizations and individuals, supported the No Action Alternative. This was primarily due to concerns with placing the facility in a currently undeveloped location, the likelihood that the facility would incrementally add to industrialization of Ivanpah Valley, and the lack of suitable mitigation and compensation for desert tortoises. Some commentors, such as the Center for Biodiversity, stated a preference for the No Action Alternative, but stated that if a facility must be built, then they preferred the Modified I-15 Alternative.

Based on the comparative analysis of the ability of each alternative to meet the purpose and need, and the environmental impacts that would be associated with each alternative, the Mitigated Ivanpah 3 Alternative is identified as the preferred alternative.

2.0 Introduction

The proposed action evaluated within this Environmental Impact Statement (EIS) is the construction, operation and maintenance, and decommissioning of the Ivanpah Solar Electric Generating System (ISEGS) project, a proposed solar-thermal electricity generation facility located on public lands managed by the Bureau of Land Management (BLM) in San Bernardino County, California. The EIS represents an environmental review document developed by BLM to evaluate potential impacts associated with the proposed action.

Because the proposed project is located on public lands managed by the BLM, BLM is the lead federal agency for evaluating environmental impacts of the proposed right-of-way grant under the National Environmental Policy Act (NEPA). The EIS is the BLM's environmental evaluation of the potential impacts that could result from the authorization of the requested right-of-way and California Desert Conservation Area (CDCA) Plan Amendment. The U. S. Department of Energy (DOE) is a cooperating agency on this EIS pursuant to a Memorandum of Understanding (MOU) between DOE and BLM signed in February 2009.

In August, 2007, the California Energy Commission (Energy Commission) and BLM California State Office entered into a MOU to jointly develop the environmental analysis documentation for solar thermal projects which are under the jurisdiction of both agencies. The purpose of the MOU is to avoid duplication of agency efforts, share agency expertise and information, promote intergovernmental coordination, and facilitate public review. On November 4, 2009, BLM and California Energy Commission (Energy Commission) staff jointly prepared the Final Staff Assessment (FSA)/Draft Environmental Impact Statement (DEIS) and Draft CDCA Plan Amendment for the ISEGS project.

The Notice of Availability (NOA) of the DEIS was published in the Federal Register (74 FR 58043) on November 10, 2009; the 90-day public review and comment period ended on February 11, 2010. During the public comment period, a variety of activities occurred in which BLM received additional information regarding the proposed project and potential alternatives, impacts, and mitigation measures. These activities included:

- Receipt of comments from the public, and other local, state, and federal agencies during the public comment period;
- Public testimony by Energy Commission staff and consultants, BrightSource staff and consultants, and intervenors associated with the Energy Commission certification process for ISEGS;
- Workshops, involving BLM staff and consultants as well as the above groups, to consider and evaluate impact analyses and mitigation approaches; and
- Submittal of additional technical reports, project design information, impact analyses, and applicant-proposed mitigation measures by BrightSource.

In addition to specific technical and process comments, additional information regarding the rationale provided in the DEIS for the elimination of two of the alternatives identified and evaluated by BLM (the Reduced Acreage Alternative and the I-15 Alternative) was

obtained through these activities. Based on the receipt of these additional data, BLM concluded that the rationale for eliminating the Reduced Acreage and I-15 Alternatives in the DEIS was insufficient, and that these two alternatives merited more detailed evaluation in a Supplemental Draft EIS (SDEIS). The Notice of the Availability of the SDEIS was published in the Federal Register (75 FR 19992) on April 16, 2010; the 45-day public review and comment period ended on June 1, 2010.

This EIS describes and evaluates the environmental impacts that are expected to result from construction, operation and maintenance, and decommissioning of the ISEGS project. It is not a decision document approving the right-of-way grant by BLM. Specifically, the EIS describes and evaluates the following:

- the proposed project;
- alternatives to the proposed project;
- the affected environment;
- whether the facilities can be constructed and operated safely and reliably in accordance with applicable laws and regulations;
- the environmental consequences of the proposed project and alternatives, including potential public health and safety impacts;
- the potential cumulative impacts of the proposed project in conjunction with other past, present, and reasonably foreseeable actions; and
- mitigation measures proposed by the applicant; BLM; other federal, state, and local agencies; local organizations; and interveners which may lessen or avoid potential impacts;

The analyses contained in this EIS are based upon information from the: 1) applicant's Application for Certification (AFC) submitted for evaluation by the Energy Commission, 2) responses to data requests, 3) supplementary information from local, state, and federal agencies; interested organizations; and individuals, 4) existing documents and publications, including the FSA/DEIS and Supplemental DEIS, 5) independent research, and 6) comments on the FSA/DEIS and Supplemental DEIS and from workshops. The EIS presents the evaluation of potential environmental impacts and conformity with laws and regulations, as well as proposed mitigation measures that have been proposed by the applicant; would be required by other Federal, state, and local agencies (including Conditions of Certification that would be required by the Energy Commission); and have been identified by BLM in this EIS as necessary to reduce identified impacts.

2.1 Background

BrightSource Energy is a U. S. Corporation whose business model includes the development and deployment of concentrating solar power tower technology. It has formed limited liability corporations Solar Partners I, II, IV, and VIII (referred to as applicant or BrightSource Energy hereafter) for the purposes of filing right-of-way (ROW) applications with the BLM for the use of public land and for filing an Application for Certification with the Energy Commission. BrightSource Energy has executed Power Purchase Agreements with Pacific Gas and Electric and interconnection agreements

with Southern California Edison to deliver 400 megawatts (MW) of electricity to the California market by the year 2013.

Through the limited liability corporations, the applicant has applied for four ROW grants from the BLM to construct the ISEGS project that will occupy 4073 acres of public land, use approximately 100 acre feet of water per year, produce a nominal 400 MWs of electricity, and operate for a term of 50 years. BrightSource has also filed an Application for Certification with the Energy Commission. Under California law, the Energy Commission has regulatory authority for certifying applications for thermal power generating facilities in excess of 50 megawatts in size.

Additionally, BrightSource has applied to DOE for a loan guarantee pursuant to Title XVII of the Energy Policy Act of 2005 (EPAct). The application for a loan guarantee for Ivanpah 1 was made in November 2008, and the application for Ivanpah 2 and 3 was made in February 2009. The EPAct established a Federal loan guarantee program for eligible energy projects that employ innovative technologies. Title XVII of EPAct authorizes the Secretary of Energy to make loan guarantees for a variety of types of projects, including those that "avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases, and employ new or significantly improved technologies as compared to commercial technologies in service in the United States at the time the guarantee is issued." The two principal goals of the loan guarantee program are to encourage commercial use in the United States of new or significantly improved energy-related technologies and to achieve substantial environmental benefits.

The proposed project could help meet the policy goals of the Federal government and State of California of achieving increased production of electricity from renewable sources. Relevant direction and policies include:

- Executive Order 13212, dated May 18, 2001, which mandates that agencies act expediently and in a manner consistent with applicable laws to increase the "production and transmission of energy in a safe and environmentally sound manner."
- The Energy Policy Act (119 Stat. 594, 600), which encourages the Department of the Interior (BLM's parent agency) to approve at least 10,000 MW of renewable energy on public lands by 2015. The proposed project would provide 400 MW of renewable energy production towards this goal.
- U.S. Department of Interior (DOI) Instruction Memorandum (IM) 2007-097, "Solar Energy Development of the Public Lands," dated April 4, 2007. This IM establishes the BLM policy to identify ROW applications for solar power development on the public lands as a "high priority field office workload" and to ensure the timely and efficient processing of ROW applications.
- Secretarial Order 3283, "Enhancing Renewable Energy Development of the Public Lands," dated January 16, 2009. This Secretarial Order facilitates DOI's efforts to achieve the goals established in Section 211 of the EPAct of 2005.
- Secretarial Order 3285, dated March 11, 2009, which "establishes the development of renewable energy as a priority for the Department of the Interior".

- California Senate Bill 1078, updated through Senate Bill 107,which established the California Renewable Portfolio Standard (RPS) requiring utilities to increase their sale of renewable energy to 20 percent by 2020.
- The California Governor's Executive Order S-14-08, establishing an RPS goal of 33 percent by 2020.

2.2 Agency Authorities and Responsibilities

The Bureau of Land Management's authority for the proposed action includes Federal Land Policy and Management Act (FLPMA) of 1976 [43 USC 1701 et seq.) and the BLM's implementing regulations (43 CFR Part 2800), Section 211 of the EPAct, and BLM's Solar Energy Development Policy of April 4, 2007. The FLPMA authorizes BLM to issue right-of-way grants for renewable energy projects. As discussed above, section 211 of the EPAct states that the Secretary of the Interior should seek to have approved a minimum of 10,000 MW of renewable energy generating capacity on public lands by 2015.

Title XVII of EPAct authorizes the Secretary of Energy to make loan guarantees for eligible projects, including those that "avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases, and employ new or significantly improved technologies as compared to commercial technologies in service in the United States at the time the guarantee is issued." BrightSource Energy has applied to DOE for a loan guarantee pursuant to Title XVII of the EPAct. DOE is participating in the review of this NEPA document as a cooperating agency (40 CFR §1508.5) to ensure that analyses needed to support its decision making on whether to provide a loan guarantee to BrightSource Energy are provided in the EIS.

2.2.1 Project Description (Case and Property Description)

The proposed action is designated by BLM as ROW serial numbers CACA 48668, CACA 49504, CACA 49503, and CACA 49502.

The site is located in Townships 16 and 17 North, Range 14 East, Dan Bernardino Meridian, approximately 4.5 miles southwest of Primm, Nevada in San Bernardino County, California. The property proposed for the rights-of-way grants comprises 3,712.7 acres of long-term (life of facility) disturbance, and 359.9 acres of temporary disturbance, for a total of 4,073 acres.

Long-term Acreages:

<u>Legal Description</u>
San Bernardino Principal Meridian

<u>Solar Partners II, LLC CACA-49504</u>

Ivanpah 1 Site
T. 16 N. R.14 E.,
Sec. 2: Lots 2, 3, 4, and SW¼NE¼, S½NW¼, SW¼, W½SE¼
Sec. 3: Lots 1, 2, and S½NE¼, SE¼NW¼, S½SW¼, SE¼
Sec. 10: NE¼, E½NW¼
Sec. 11: W½NE¼, NW¼

<u>*Solar Partners I, LLC CACA-48668*</u>

Ivanpah 2 Site
T. 17 N., R. 14 E.,
Sec. 27: SW¼SE¼, SW¼
Sec. 28: SE¼SW¼, SE¼
Sec. 33: E½, E½W½
Sec. 34: W½E½, W½

<u>*Solar Partners VIII, LLC CACA-49503*</u>

Ivanpah 3 Site
T. 17 N., R.14 E.,
Sec. 20: E½, E½W½
Sec. 21: All
Sec. 22: W½W½
Sec. 27:W½NW¼, NW¼SW¼
Sec. 28: N½, SW¼, N½SE¼, SW¼SE¼
Sec. 29: E½, SE¼NW¼, E½SW¼

<u>*Solar Partners IV, LLC CACA-49502*</u>

Administrative Site and Substation
T. 16 N., R. 14 E.,
Sec. 3: NW¼NE¼, N½NW¼, SW¼NW¼
Sec. 4: E½NE¼

T.17 N., R.14 E.,
Sec. 34: S½SW¼

Temporary Acreages:

<u>Legal Description</u>
San Bernardino Principal Meridian

Temporary Construction Logistics Area
T. 16 N., R. 14 E.,
Sec. 3: W½NE¼, NE¼, N½SW¼
Sec. 4: NE¼, NE¼SE¼

T. 17 N., R. 14 E.,
Sec. 33: SE¼SW¼, S½SE¼
Sec. 34: S½SW¼, SW¼SE¼

2.2.2 Applicant Objectives

The applicant's project objectives are set forth below. The fundamental objective is to build a solar project that generates 400 MW of renewable solar energy that will help the State meet its Renewable Portfolio Standard goals for new renewable electric generation. To assist in meeting the requirement for additional generating capacity, the Applicant (BrightSource) has developed solar technology which requires commercial-scale development to demonstrate its technical and commercial viability, and has

entered into power purchase agreements to provide power from renewable sources into the California Independent System Operator (CAISO) system.

1. To safely and economically construct and operate a nominal 400-MW, solar generating facility in California capable of selling competitively priced renewable energy consistent with the needs of California utilities.
2. To demonstrate the technical and economic viability of Bright Source's technology in a commercial-scale project.
3. To locate the facility in areas of high solarity with ground slope of less than 5 percent.
4. To minimize infrastructure needs and reduce environmental impacts by locating the plant near existing and planned infrastructure, including: CAISO transmission lines, a source of natural gas, and an adequate water supply.
5. To avoid siting the plant in areas that are highly pristine or biologically sensitive (e.g., a Desert Wildlife Management Area).
6. To locate the project consistent with existing land use plans. If on public land, to comply with the multiple use objectives of the FLPMA, which includes renewable energy development, and the objectives of the CDCA Resource Management Plan (RMP), which allows for solar energy development in some areas.
7. To assist California in repositioning its generation asset portfolio to use more renewable energy in conformance with State Policy, including the policy objectives set forth in Senate Bill (SB) 1078 (California Renewable Portfolio Standard Program) and Assembly Bill (AB) 32 (California Global Warming Solutions Act of 2006).
8. To comply with provisions of the power sales agreement in negotiation for the first projects, to develop a project that can interconnect to a CAISO transmission line with the potential of achieving a commercial on-line date in 2010, but no later than 2011.

2.2.3 BLM Purpose and Need

NEPA guidance published by the Council on Environmental Quality (CEQ) states that environmental impact statements' Purpose and Need section "shall briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action" (40 CFR §1502.13). The following discussion sets forth the purpose of, and need for, the project as required under NEPA.

BLM's purpose and need for the ISEGS project is to respond to the applicant's application under Title V of the FLPMA (43 USC 1761) for a ROW grant to construct, operate, maintain, and decommission a concentrated solar electric generation plant on public land along with the associated infrastructure in compliance with FLPMA, BLM regulations, and other applicable federal laws. The BLM will approve, approve with modifications, or disapprove ROW applications filed by Solar Partners I, LLC; Solar Partners II, LLC; Solar Partners IV, LLC; and Solar Partners VIII, LLC (applicant), which are subsidiaries of BrightSource Energy, Inc. to develop the ISEGS project. The BLM will determine and disclose the environmental impacts of the ISEGS proposal and decide whether granting the requested ROW is in the public interest. The BLM has determined that the proposed solar project and associated ROW would require an

amendment to the CDCA Plan. The BLM will also consider the amendment of the CDCA Plan to identify the ISEGS site.

In conjunction with FLPMA, BLM authorities include the relevant direction and policies noted above.

2.2.4 DOE Purpose and Need

The EPAct established a Federal loan guarantee program for eligible energy projects that employ innovative technologies. Title XVII of the EPAct of 2005 authorizes the Secretary of Energy to make loan guarantees for a variety of types of projects, including those that "avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases, and employ new or significantly improved technologies as compared to commercial technologies in service in the United States at the time the guarantee is issued".

The two principal goals of the loan guarantee program are to encourage commercial use in the United States of new or significantly improved energy-related technologies and to achieve substantial environmental benefits. The purpose and need for action by DOE is to comply with its mandate under EPAct by selecting eligible projects that meet the goals of the Act. DOE is using this NEPA process to assist in determining whether to issue a loan guarantee for BrightSource Energy to support the proposed project.

2.2.5 Land Use Plan Conformance and Amendment (BLM)

The principal land use plan affecting this proposed project is BLM's CDCA Plan of 1980, as amended, and the Northern and Eastern Mojave Desert Management Plan (NEMO), which amends the CDCA Plan for those areas identified as the northern and eastern Mojave Desert. In the CDCA Plan, the location of the proposed ISEGS facility includes land that is classified as Multiple-Use Class L (Limited Use). The Plan states that solar power facilities may be allowed within Limited Use areas after NEPA requirements are met. This EIS is the mechanism for complying with those NEPA requirements.

Because solar power facilities are an allowable use of the land as it is classified in the CDCA Plan, the proposed action does not conflict with the Plan. However, Chapter 3, "Energy Production and Utility Corridors Element" of the Plan also requires that sites associated with power generation and transmission not already identified in the Plan be considered through the Plan Amendment process. The site for the proposed ISEGS facility is not currently identified within the Plan, and therefore a Plan Amendment is required to include that site as a recognized location within the planning boundary. Approval of this power generation site would result in an amendment to the Energy Production and Utility Corridors Element.

Other Agency Plans. In March, 2008, the BLM entered into a MOU (BLM Agreement No. 08-223) with San Bernardino County to establish a cooperative process for conducting environmental reviews of proposed projects located on BLM-managed lands located within the County. Under the terms of the MOU, the BLM acts as the lead agency for NEPA evaluation of each proposed project. The County acts as the California Environmental Quality Act (CEQA) lead agency, except in cases involving thermal energy projects that exceed 50 MW in size, in which case the Energy

Commission is designated as the lead and the County acts as a cooperating agency. For this proposed project, the Energy Commission is the lead agency for CEQA, and an analysis of conformance with applicable San Bernardino County land use plans is included within Section 5.6 of this EIS.

Land within San Bernardino County is classified according to Land Use Zoning Designations under the San Bernardino County General Plan, and Land Use Zoning Districts under the County Development Code. The Development Code implements the General Plan by regulating the use of land within unincorporated portions of the County. The Development Code identifies the land area of the proposed ISEGS facility as Resource Conservation (RC), a designation that allows use for electric power generation. Therefore, the proposed project conforms to the applicable County General Plan.

Planning Criteria (BLM)

The CDCA Plan planning criteria are the constraints and ground rules that guide and direct the development of the Plan Amendment. They ensure that the Plan Amendment is tailored to the identified issues and ensure that unnecessary data collection and analyses are avoided. They focus on the decisions to be made in the Plan Amendment, and will achieve the following:

"Sites associated with power generation or transmission not identified in the Plan will be considered through the Plan Amendment process."

Because the site for the proposed ISEGS facility is not currently identified within the CDCA Plan, an amendment to identify that site is needed. As specified in Chapter 7, Plan Amendment Process, there are three categories of Plan Amendments, including:

- Category 1, for proposed changes that will not result in significant environmental impact or analysis through an Environmental Impact Statement;
- Category 2, for proposed changes that would require a significant change in the location or extent of a multiple-use class designation; and
- Category 3, to accommodate a request for a specific use or activity that will require analysis beyond the Plan Amendment Decision.

Based on these criteria, approval of the proposed project would require a Category 3 amendment. This section summarizes the procedures necessary to evaluate the proposed Plan Amendment, as well as the procedures required to perform the environmental review of the ROW application.

Statement of Plan Amendment. The Implementation section of the Energy Production and Utility Corridors Element of the CDCA Plan lists a number of Category 3 amendments that have been approved since adoption of the Plan in 1980. An additional amendment is proposed to be added to this section of the Plan, and would read "Permission granted to construct solar energy facility on a power generation site (proposed Ivanpah Solar Electric Generating System)."

Plan Amendment Process. The Plan Amendment process is outlined in Chapter 7 of the Plan. In analyzing an applicant's request for amending or changing the Plan, the BLM District Manager, Desert District, will:

1. Determine if the request has been properly submitted and if any law or regulation prohibits granting the requested amendment.
2. Determine if alternative locations within the CDCA are available which would meet the applicant's needs without requiring a change in the Plan's classification, or an amendment to any Plan element.
3. Determine the environmental effects of granting and/or implementing the applicant's request.
4. Consider the economic and social impacts of granting and/or implementing the applicant's request.
5. Provide opportunities for and consideration of public comment on the proposed amendment, including input from the public and from federal, State, and local government agencies.
6. Evaluate the effect of the proposed amendment on BLM management's desert-wide obligation to achieve and maintain a balance between resource use and resource protection.

Decision Criteria for Evaluation of Proposed Plan Amendment. The Decision Criteria to be used for approval or disapproval of the proposed amendment require that the following determinations be made by the BLM Desert District Manager:

1. The proposed amendment is in accordance with applicable laws and regulations;
2. The proposed amendment will provide for the immediate and future management, use, development, and protection of the public lands within the CDCA.

The BLM Desert District Manager will base the rationale for these determinations on the principles of multiple use, sustained yield, and maintenance of environmental quality as required in the FLPMA of 1976. Multiple use is defined as management of public lands and their resource values in a combination that best meets the needs of present and future Americans, using some land for less than all of the resources, taking into account balanced and diverse use with long-term needs, and coordinating management of various resources without permanent impairment of productivity and environmental quality considering the relative values of the resources. Sustained yield is defined as achievement and maintenance in perpetuity of a high level annual or regular periodic output of the various renewable resources of the public lands consistent with multiple use. In this context, the authorized officer will determine whether the proposed action comports with these FLPMA principles.

Decision Criteria for Evaluation of Application. In addition to defining the required analyses and Decision Criteria for Plan Amendments, the Plan also defines the Decision Criteria to be used to evaluate future applications in the Energy Production and Utility Corridors Element of Chapter 3. These Decision Criteria include:

1. Minimize the number of separate rights-of-way by utilizing existing rights-of-way as a basis for planning corridors;
2. Encourage joint-use of corridors for transmission lines, canals, pipelines, and cables;
3. Provide alternative corridors to be considered during processing of applications;
4. Avoid sensitive resources wherever possible;

5. Conform to local plans whenever possible;
6. Consider wilderness values and be consistent with final wilderness recommendations;
7. Complete the delivery systems network;
8. Consider ongoing projects for which decisions have been made; and
9. Consider corridor networks which take into account power needs and alternative fuel resources.

Factors to be Considered. The Plan also states that, in the evaluation of proposed power plants, BLM will use the same factors affecting the public lands and their resources as those used by the Energy Commission. At the time the CDCA Plan was written, those factors included 1) consistency with the Desert Plan, 2) protection of air quality, 3) impact on adjacent wilderness and sensitive resources, 4) visual quality, 5) fuel sources and delivery systems, 6) cooling-water sources, 7) waste disposal, 8) seismic hazards, and 9) regional equity. These factors are now considered to include the environmental information requirements defined in the California Code of Regulations (CCR) Title 20, Appendix B, which include:

- General (Project Overview)
- Cultural Resources
- Land Use
- Noise
- Traffic and Transportation
- Visual Resources
- Socioeconomics
- Air Quality
- Public Health
- Hazardous Materials Handling
- Worker Safety
- Waste Management
- Biological Resources
- Water Resources
- Soils
- Paleontological Resources
- Geological Hazards and Resources
- Transmission System Safety and Nuisance
- Facility Design
- Transmission System Design
- Reliability
- Efficiency

The specific determinations required for the Plan Amendment evaluation are discussed in detail below. This EIS acts as the mechanism for evaluating both the proposed project application, and the proposed Plan Amendment. The factors specified in CCR Title 20, Appendix B are included within the scope of the analysis presented in the EIS.

Results of CDCA Plan Amendment (BLM)

Required Determinations

1. Determine if the request has been properly submitted and if any law or regulation prohibits granting the requested amendment.

The applicant's request for a right-of-way was properly submitted, and this EIS acts as the mechanism for evaluating and disclosing environmental impacts associated with that applications. No law or regulation prohibits granting the amendment.

2. Determine if alternative locations within the CDCA are available which would meet the applicant's needs without requiring a change in the Plan's classification, or an amendment to any Plan element.

The CDCA Plan does not currently identify any sites as solar generating facilities. Therefore, there is no other location on public land within the CDCA which could serve as an alternative location without requiring a Plan Amendment. The proposed project does not require a change in the Multiple-Use Class classification for any area within the CDCA.

3. Determine the environmental affects of granting and/or implementing the applicant's request.

This EIS acts as the mechanism for evaluating the environmental effects of granting the right-of-way and the Plan Amendment.

4. Consider the economic and social impacts of granting and/or implementing the applicant's request.

This EIS acts as the mechanism for evaluating the economic and social impacts of granting the right-of-way and the Plan Amendment.

5. Provide opportunities for and consideration of public comment on the proposed amendment, including input from the public and from federal, State, and local government agencies.

A Notice of Intent (NOI) to amend the CDCA Plan was published in the Federal Register November 6, 2008, Vol. 72, No. 214 Fed. Reg.62671-62672. Three respondents, all government agencies, provided comments during the 30-day NOI scoping period. Although not part of BLM's required NEPA or Plan Amendment process, public comments were also received on the Preliminary Staff Assessment (PSA) published by the Energy Commission in December, 2008. In response to the PSA, 13 respondents provided comments. These included government agencies, environmental organizations, and individuals with no stated affiliation. In response to the FSA/DEIS, 40 respondents provided comments. In response to the Supplemental DEIS, 20 respondents provided comments.

In accordance with the NOI, issues identified during the scoping period are placed in the comment categories below.

1. Issues to be resolved in the plan amendment

Several commenters who provided comments on the PSA, DEIS, and Supplemental DEIS expressed concern that the proposed project was not in conformance with the

CDCA Plan, and that such conformance should be achieved before the project would be approved. These comments are being resolved through this Plan Amendment.

2. Issues to be resolved through policy or administrative action

All other comments received addressed specific environmental impacts and mitigation measures that each commenter requested be analyzed in the EIS. These comments are being resolved by being considered within this EIS.

3. Issues beyond the scope of this plan amendment

Several commenters requested that the scope of the Plan Amendment be broadened to include issues other than evaluation of the BrightSource ROW application. These comments were outside of the scope of the analysis in this EIS and Plan Amendment.

1. Evaluate the effect of the proposed amendment on BLM management's desert-wide obligation to achieve and maintain a balance between resource use and resource protection.

The balance between resource use and resource protection is evaluated within the EIS. Title VI of the FLPMA, under California Desert Conservation Area, provides for the immediate and future protection and administration of the public lands in the California desert within the framework of a program of multiple use and sustained yield, and maintenance of environmental quality. Multiple use includes the use of renewable energy resources, and through Title V of FLPMA, the BLM is authorized to grant rights-of-way for generation and transmission of electric energy. The acceptability of use of public lands within the CDCA for this purpose is recognized through the Plan's approval of solar generating facilities within Multiple-Use Class L. The purpose of the EIS is to identify resources which may be adversely impacted by approval of the proposed project, evaluate alternative actions which may accomplish the purpose and need with a lesser degree of resource impacts, and identify mitigation measures and Best Management Practices (BMPs) which, when implemented, would reduce the extent and magnitude of the impacts and provide a greater degree of resource protection.

Conformance of ROW Application with Decision Criteria (BLM)

1. Minimize the number of separate rights-of-way by utilizing existing rights-of-way as a basis for planning corridors.

The proposed project assists in minimizing the number of separate rights-of-way by being proposed in close proximity to existing Corridors D and BB. Electrical transmission associated with the proposed project will occur within these existing corridors, and placement of the facility adjacent to these corridors minimizes the length of new corridors necessary for transmission of natural gas to the site.

1. Encourage joint-use of corridors for transmission lines, canals, pipelines, and cables.

Placement of the proposed project adjacent to existing Corridor D maximizes the joint-use of this corridor for natural gas and electrical transmission.

2. Provide alternative corridors to be considered during processing of applications.

This decision criterion is not applicable to the proposed project. Placement of the proposed facility adjacent to existing corridors does not require designation of alternative corridors to support the proposed project.

3. Avoid sensitive resources wherever possible;

The extent to which the proposed project has been located and designed to avoid sensitive resources is addressed throughout the EIS. BLM and other Federal regulations that restrict the placement of proposed facilities, such as the presence of designated Wilderness Areas or Desert Wildlife Management Areas were considerations in the original siting process used by the applicant and discussed with BLM during pre-application proceedings (43 CFR 2804.10) to identify potential project locations. The project location and configurations of the boundaries were modified in consideration of mineral resources. The alternatives analysis presented in the DEIS, and supplemented in the SDEIS and FEIS, considered whether the purpose and need of the proposed project could be achieved in another location, but with a lesser effect on sensitive resources.

4. Conform to local plans whenever possible;

The extent to which the proposed project conforms to local plans is addressed within the Land Use section of the EIS. The proposed project is in conformance with the San Bernardino County General Plan.

5. Consider wilderness values and be consistent with final wilderness recommendations;

The proposed project is not located within a designated Wilderness Area or Wilderness Study Area.

6. Complete the delivery systems network;

This decision criterion is not applicable to the proposed project.

7. Consider ongoing projects for which decisions have been made; and

This decision criterion is not applicable to the proposed project. Approval of the proposed project would not affect any other projects for which decisions have been made.

8. Consider corridor networks which take into account power needs and alternative fuel resources.

This decision criterion is not applicable to the proposed project. The proposed project does not involve the consideration of an addition to or modification of the corridor network. However, it does utilize facilities located within Corridors D and BB, which were designed with consideration of both power needs and locations of alternative fuel resources.

2.2.6 Project Evaluation and Decision Process

BLM Process

The Final EIS (FEIS) will be available for public review for a minimum of 30-days before the BLM issues a Record of Decision (ROD). When the ROD is issued, the decision regarding the ROW grant is in full force and effect, however it is appealable to the Interior Board of Land Appeals upon issuance of the ROD. The FEIS will also contain a proposed decision to amend the CDCA Plan. Proposed plan amendment decisions may be protested within 30-days of the proposed decision. BLM cannot make a final decision regarding issuance of a ROW grant or amending the Plan until any Plan protest is resolved.

Under the NEPA process, if an EIS is prepared, the BLM has made a determination of potential significant effect. In the discussion of environmental consequences, the EIS is required to include the environmental impacts of the proposed action and its alternatives, any adverse environmental effects which cannot be avoided if the project is implemented, the relationship between short-term use and long-term productivity, and any irreversible or irretrievable commitments of resources. The FEIS is to include a discussion of direct and indirect effects and their significance, possible conflicts between the proposed action and local land use, a comparison of effects among the alternatives, energy requirements, conservation potential, resource requirements and measures to mitigate adverse effects (40 CFR 1502.16). Impacts in an EIS are to be discussed in proportion to their significance, and are to contain only a brief discussion of other than significant issues (40 CFR 1502.2). The CEQ NEPA regulations provide a definition of “significantly” as used in the NEPA context (40 CFR 1508.27).

As outlined in NEPA regulations Section 1502.16, the analysis also includes a discussion of both direct and indirect effects and their significance, adverse environmental effects which cannot be avoided, whether impacts are short-term or long-term, and any irreversible or irretrievable commitments of resources.

DOE Process

DOE will carry out an independent review of the FEIS to ensure that DOE comments have been addressed and that the proposed action is substantially the same as the action described in the DEIS. If these conditions are met, DOE will adopt the FEIS without recirculating it pursuant to CEQ NEPA regulations at 40 CFR 1506.3(c).

While the FEIS was being developed, DOE also carried out a detailed technical and legal evaluation of the proposed project pursuant to its procedures for loan guarantees set out at 10 CFR Part 609. On February 22, 2010, DOE announced conditional commitments for more than $1.37 billion in loan guarantees under the American Recovery and Reinvestment Act to BrightSource Energy, Inc. to support the construction and start-up of Ivanpah Units 1, 2, and 3. A condition precedent is included in the conditional commitment that requires completion of the NEPA review and the BLM ROW grant process before DOE closes the loan guarantee transaction.

Following conclusion of the NEPA process and the BLM decision on issuance of the ROW grant, DOE will decide whether to issue a ROD and proceed to close the loan

guarantee transaction provided that the applicant has satisfied all the detailed terms and conditions contained in the conditional commitment and other related documents, and all other contractual, statutory, and regulatory requirements.

Agency Coordination

California Energy Commission

The Energy Commission has the exclusive authority to certify the construction, modification, and operation of thermal electric power plants 50 megawatts (MW) or larger. The Energy Commission certification is in lieu of any permit required by state, regional, or local agencies and by federal agencies to the extent permitted by federal law (Pub. Resources Code, § 25500). The Energy Commission must review power plant AFCs to assess potential environmental impacts including potential impacts to public health and safety, potential measures to mitigate those impacts (Pub. Resources Code, § 25519), and compliance with applicable governmental laws or standards (Pub. Resources Code, § 25523 (d)). The Energy Commission staff's analyses were prepared in accordance with Public Resources Code, section 25500 et seq.; Title 20, California Code of Regulations, section 1701 et seq.; and CEQA (Pub. Resources Code, § 21000 et seq.).

As discussed above, the DEIS for this proposed project was developed as a joint environmental review document, the FSA/DEIS, under an MOU between the Energy Commission and BLM California State Office. Throughout the environmental review process, BLM and Energy Commission staff have conducted joint technical analysis, and co-authored the FSA/DEIS. Following the completion of the FSA/DEIS, BLM and the Energy Commission's environmental review process was separated, as BLM prepared a stand-alone Supplemental DEIS and this FEIS, and the Energy Commission prepared a stand-alone FSA Addendum to evaluate additional project alternatives. Throughout the process subsequent to the publication of the FSA/DEIS, BLM and Energy Commission staff have continued to review each other's documents in an attempt to maintain consistency between the documents to the extent feasible.

The Energy Commission certification is in lieu of any permit required by state, regional, or local agencies and by federal agencies to the extent permitted by federal law (Pub. Resources Code, § 25500). However, both the Commission and BLM typically seek comments from and work closely with other regulatory agencies that administer laws and regulations that may be applicable to the proposed project. The following paragraphs describe the agency coordination that has occurred through this joint SA/EIS process.

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (USACE) has jurisdiction to protect water quality and wetland resources under Section 404 of the Clean Water Act. Under that authority, USACE reviews proposed projects to determine whether they may impact such resources, and/or be subject to a Section 404 permit. Throughout the EIS process, the Energy Commission, BLM, and the applicant have provided information to the USACE to assist them in making a determination regarding their jurisdiction and need for a Section 404 permit. The USACE rendered a final opinion on May 28, 2009 concluding

that the project does not affect waters of the U.S. and thus does not require such a permit.

National Park Service

The National Park Service manages the Mojave National Preserve (MNP), which is located near the proposed project area. Because of the proximity of the MNP, the Park Service has been invited to participate in scoping meetings and public workshops, and has been provided the opportunity review and provide comment on the PSA and EIS.

U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS) has jurisdiction to protect threatened and endangered species under the Endangered Species Act (ESA). Formal consultation with the USFWS under Section 7 of the ESA is required for any federal action that may adversely affect a federally-listed species. The desert tortoise (*Gopherus agassizii*), which occurs in the proposed project area, is a federally-listed threatened species, and therefore formal consultation with the USFWS is required. This consultation has been initiated through the preparation and submittal of a Biological Assessment (BA) which describes the proposed project to the USFWS. Following review of the BA, the USFWS is expected to issue a Biological Opinion (BO) which will specify mitigation measures which must be implemented for the protection of the desert tortoise.

State Water Resources Control Board/Regional Water Quality Control Board

The Lahontan Regional Water Quality Control Board (RWQCB) has the authority to protect both surface water and groundwater resources at the proposed project location. Throughout the EIS process, the Energy Commission, BLM, and the applicant have invited the RWQCB to participate in public scoping and workshops, and have provided information to assist the RWQCB in evaluating the potential impacts and permitting requirements of the proposed project. The RWQCB has responded by providing comments that have been evaluated and incorporated into the EIS analysis. The RWQCB has also made a determination that the proposed project would impact waters of the state, and has specified conditions to satisfy requirements of a dredge and fill permit/waste discharge requirements.

California Department of Fish and Game

The California Department of Fish and Game (CDFG) has the authority to protect water resources of the state through regulation of modifications to streambeds, under Section 1602 of the Fish and Game Code. The Energy Commission, BLM, and the applicant have provided information to CDFG to assist in their determination of the impacts to streambeds, and identification of permit and mitigation requirements. The applicant filed a Streambed Alteration Agreement with CDFG on June 2, 2009. The requirements of the Streambed Alteration Agreement will be included as a recommended Mitigation Measure.

CDFG also has the authority to regulate potential impacts to species that are protected under the California Endangered Species Act (CESA). On May 22, 2009, the applicant filed an application for authorization for incidental take of the desert tortoise under Section 2081(b) of the CESA. The requirements of the Incidental Take Permit will be included as a recommended Mitigation Measure.

Tribal Relationships

The BLM has notified affected Indian Tribes regarding the proposed project, has sought their comments and has invited them to consult on the project on a government-to-government basis.

County of San Bernardino

On March 18, 2008, the BLM California Desert District entered into an MOU with the County of San Bernardino to coordinate environmental reviews for renewable energy projects on public land within the County. Under this MOU, BLM will invite the County to become a cooperating agency for EISs, and will provide opportunities for County staff to review and participate in technical discussions and analyses. San Bernardino Count y has requested cooperating agency status pursuant to the MOU. BLM has provided the County with project-related documentation for their review and evaluation.

Wilderness Review Considerations

All Public Lands within the California Desert District (CDD) were analyzed and summarized in 1979 wilderness inventory decisions performed pursuant to the FLPMA. See *"California Desert Conservation Area - Wilderness Inventory –Final Descriptive– March 31, 1979"*. Public Land in the ISEGS [CACA 48668, 49502, 49503,49504] project area are contained within CDCA Wilderness Inventory Units [hereafter WIU] #CDCA 226 and 231.

WIU #CDCA 226 is bounded on the west by roads, by utility line corridors on the north and southeast, and the California- Nevada state line on the east. WIU #CDCA 231 is immediately south and is bounded on the northwest by the power line, on the southeast by the Interstate -15 corridor, and on the west by Mountain Pass Road. Both WIUs are dominated by bajadas draining east into Ivanpah Dry Lake, which are lightly vegetated with creosote communities.

The 1979 decision was that the imprints of man were substantially noticeable and that opportunities for solitude and primitive recreation were not outstanding. Each WIU contained signs of mining in the western portions, many roads and routes, and utility lines. The WIUs did not contain outstanding opportunities for solitude due to their size combined with only light vegetative and topographic screening. No one recreational opportunity or combination of recreational opportunities was considered outstanding.

The two inventories were maintained in 2010. The western 1/3 of WIU #CDCA 226 was transferred to the National Park Service in 1994, so it now bounded on the west by the Mojave National Preserve. Virtually all routes within the WIUs were designated as 'open' in a CDCA LUP Amendment and continue to be distinct due to vehicle use. Approximately five ROW grants for additional facilities have been approved in this WIU since 1980. Imprints of man remain substantially noticeable and opportunities for solitude and primitive recreation continue to not be outstanding.

Therefore, wilderness characteristics will not be analyzed further.

Public Coordination

Both the BLM's NEPA process and the Energy Commission's CEQA-equivalent process provide opportunities for public participation in the scoping of the environmental analysis. For the Energy Commission, this outreach program is primarily facilitated by the Public Adviser's Office (PAO). As part of the coordination of the environmental review process required under the Energy Commission/BLM California Desert District MOU, the agencies have jointly held public meetings and workshops which accomplish the public coordination objectives of both agencies. This is an ongoing process that to date has involved the following efforts.

Libraries

The AFC was sent to the main county libraries in San Bernardino, Barstow, Fresno, and Eureka; the main branches of the San Diego and San Francisco public libraries; the University Research Library at UCLA; the California State Library, and the Energy Commission's library in Sacramento.

Outreach Efforts

BLM solicited interested members of the public and agencies through the NEPA scoping process. BLM published a Notice of Intent to develop the EIS and amend the CDCA Plan in the Federal Register, Vol. 72, No. 214, page 62671, on November 6, 2007. The initial Public Scoping meeting was held on January 4, 2008, and coincided with the Informational Hearing held by the Energy Commission. On January 9, 2009, BLM published notice of an extension of the public scoping period, and an additional joint public scoping meeting was held on January 25, 2008.

Following the scoping period, the Energy Commission and BLM held additional joint Issue Resolution workshops which were announced and made available to the public. These workshops were held on June 23, 2008 in Primm, Nevada, and on July 31 and December 15, 2009 in Sacramento, California. The Energy Commission continued to accept and consider public comments, and granted petitions to intervene to eight interested groups including Defenders of Wildlife, Sierra Club, Basin and Range Watch, and Center for Biological Diversity (June 2, 2009), California Native Plant Society, Western Watersheds, CURE, and San Bernardino County. Although not officially part of BLM's NEPA process, BLM's NEPA analysis was supported by information received through these activities.

The BLM public participation process included soliciting comments regarding the scope of the analysis from other government agencies, the public, and non-governmental organizations. The persons and organizations which provided scoping comments, and the general issues addressed within their comments, are provided in **Table 2.1**.

The NOA of the DEIS was published on November 10, 2009; the 90-day public review and comment period ended on February 11, 2010. During the public comment period, a variety of activities occurred in which BLM received additional information regarding the proposed project and potential alternatives, impacts, and mitigation measures. These activities included:

- Receipt of comments from the public, and other local, state, and federal agencies during the public comment period;

- Public testimony by Energy Commission staff and consultants, BrightSource staff and consultants, and intervenors associated with the Energy Commission certification process for ISEGS;
- Workshops, involving BLM staff and consultants as well as the above groups, to consider and evaluate impact analyses and mitigation approaches; and
- Submittal of additional technical reports, project design information, impact analyses, and applicant-proposed mitigation measures by BrightSource.

The NOA of the SDEIS was published on April 16, 2010; the 45-day public review and comment period ended on June 1, 2010.

The applicant's Application for Certification to the Energy Commission (CH2M Hill 2007), the Energy Commission's PSA, and the joint BLM/Energy Commission FSA/DEIS are all publicly available on the Energy Commission website at http://www.energy.ca.gov/sitingcases/ivanpah/index.html.

Summary of Public and Agency Scoping Comments

The BLM and Energy Commission processes include soliciting comments regarding the scope of the analysis from other government agencies, the public, and non-governmental organizations. The persons and organizations which provided scoping comments, and the general issues addressed within their comments, are provided in **Table 2.1** below.

Summary of Public Comments on DEIS and Supplemental DEIS

BLM received comments on the DEIS from 37 individuals, groups, and agencies. These comments are summarized in Appendix A-1 of this FEIS. Comments from 20 individuals, groups, and agencies were received on the SDEIS, and these comments are summarized in Appendix A-2 of this FEIS. Both sets of comments included hundreds of comments received both in favor of the project, and in opposition to the project, in the form of mass mailings and e-mails. The summaries in Appendices A-1 and A-2 include a description of how each comment was evaluated and responded to by BLM. Also, where a comment is particularly relevant to the technical discussion in the text of the FEIS (either comments resulting in revision to the FEIS, or comments dissenting from important conclusions of the FEIS), that information has been incorporated into the revisions for the FEIS. Section 9 also provides a discussion of the comments, including both those which resulted in a change to the text in the FEIS, and those which were considered, but did not result in a change. The comments generally addressed the following topics

- The range of alternatives considered and evaluated, and the methodology for evaluating the alternatives;
- The scope of projects considered in the cumulative impacts analysis, and the methodology for conducting that analysis;
- Opposition to the contribution of the project to industrialization of Ivanpah Valley; and
- Specific comments related to impacts to biological resources, the Mojave National Preserve, air traffic, County services, and other resources.

Table 2.1
Scoping Comments Received

Date	Name, Title, Association/ Location	Issue addressed within Comment
Oct. 18,2007	Mack Hakakian, PG, Engineering Geologist, California Regional Water Quality Control Board Lahontan Region	Impacts to surface Water of the State and/or Water of the U.S, pre and post construction stormwater management, Water Quality Certification, Design features (runoff and drainage), Wastewater Discharge
Oct. 25, 2007	Curt Shifrer, Water Resources Control Engineer, California Regional Water Quality Control Board Lahontan Region	Groundwater Quality, Wastewater Discharge, Aboveground Surface Irrigation system, Sub-surface irrigation system
Sept. 26, 2007	Carrie Hyke, AICP, Principal Planner, San Bernardino County Land Use Service Department Advance Planning Division, Environmental & Mining Section, County of San Bernardino Public and Support Services Group, Department of Public Works	Biological Impacts, Cultural Resources, Fire Hazards, Groundwater
January 2, 2008	Mia Ratcliff, Manager, Planning and Programming Branch, U.S. Department of Transportation Federal Aviation Administration, Western Pacific region, Airports Division	Impacts resulting from thermal plumes, glare, and presence of proposed towers.
Jan. 23, 2009	Alice Bond, Regional Program Coordinator, The Wilderness Society, California/Nevade Regional Office Alex Daue, Renewable Energy Coordinator, The Wilderness Society, BLM Action Center Johanna Wald, Senior Attorney, Natural Resources Defense Council	Encourages agency (Energy Commission and BLM) coordination in ROW permitting application. Addresses characteristics conducive to utility-scale development within the project area. Impacts to Natural, Cultural and Visual Resources, Air Quality. Public Benefits (relating to Greenhouse Gas Emissions)
June 22,2009	Sidney Silliman, San Gorgonio Chapter and Desert Committee, Sierra Club	Designation of Areas of Critical Environmental Concern, retire Clark Mountain Grazing Allotment, Alternative Site Analysis (Site Relocation)

2.2.7 Organization of the Document

The FEIS is organized as follows:

Section 1 – Executive Summary summarizes the EIS.

Section 2 – Introduction discusses the purpose and need for the proposed project, as well as BLM's processes for the CDCA Plan Amendment and the EIS.

Section 3 – Alternatives, Including the Proposed Action, provides a detailed description of the proposed project and those alternatives which have been retained for detailed evaluation. The section also describes BLM's methodology for identifying and screening alternatives, and describes the rationale for elimination of other alternatives from detailed evaluation.

Section 4 – Affected Environment and Environmental Consequences. The environmental and public health and safety analyses of the proposed project are contained in Section 4. They include the following: Air Quality, Greenhouse Gases, Biological Resources, Cultural Resources and Native American Values, Hazardous Materials Management, Land Use, Noise and Vibration, Public Health and Safety, Socioeconomics and Environmental Justice, Soil and Water Resources, Traffic and Transportation, Transmission Line Safety and Nuisance, Visual Resources, Waste Management, , Worker Safety and Fire Protection, Geology, Paleontology and Minerals, Livestock Grazing, Wild Horses and Burros, and Recreation.

Each of these 19 technical area assessments includes a discussion of:

- Detailed project-specific information that is directly relevant to the resource being evaluated;
- Laws and regulations;
- Affected environment;
- Project direct and indirect impacts from construction, operations, and closure and decommissioning impacts;
- Beneficial impacts;
- Impacts of alternatives, including the No Action Alternative;
- Mitigation Measures; and
- Summary

Section 5 – Cumulative Effects, including identification of the past, present, and reasonably foreseeable future projects, and an evaluation of the cumulative impacts resulting from those projects in combination with the proposed project and alternatives.

Section 6 – Other NEPA Considerations provides an evaluation of the irreversible and irretrievable commitment of resources, unavoidable adverse impacts, and growth inducing effects.

Section 7 – General Conditions, which provides the General Conditions of Approval that are proposed for inclusion in the ROW grant.

Section 8 – Summary, which summarizes the results of the environmental analysis, and identifies BLM's preferred alternative.

Section 9 – Public Participation summary

Section 10 – List of Preparers

Section 11 – References

Appendix A provides a summary of public comments received on the DEIS and SDEIS, including BLM's responses to the comments.

Appendix B contains technical resource-specific appendices that provide additional information to support the technical analyses in Section 4.

Appendix C provides additional information developed by the Energy Commission which is not part of BLM's environmental analysis, but describes additional features of the proposed action. This includes the Energy Commission's General Conditions of Certification that are specific to the Energy Commission's certification process. In addition, engineering analyses performed by the Energy Commission are included in Appendix C, and include sections on Facility Design, Power Plant Efficiency, Power Plant Reliability, and Transmission System Engineering.

3.0 Alternatives including the Proposed Action

This section summarizes the alternatives identification and screening process, provides a detailed description of those alternatives which were retained for detailed evaluation, and summarizes the rationale for the elimination of other alternatives that were considered but eliminated from detailed evaluation.

3.1 Overview of Alternatives Development

The alternatives evaluation process in this EIS is a multi-step process which follows the requirements provided in 40 CFR 1502.14. Section 1502.14(a) specifies that the agency "shall rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated". This section of the EIS will:

- Identify potential alternatives;
- Perform a screening analysis to identify those which are reasonable and feasible, to be retained for more detailed analysis; and
- Provide the rationale for elimination of those alternatives which are not reasonable or feasible.

Twenty-five alternatives to the ISEGS project have been identified and evaluated in this section. These include nine alternative site locations, as well as different solar technologies, different renewable technologies, generation technologies using different fuels, and conservation/demand-side management. The range of alternatives identified includes alternatives which are not within the lead agency's (BLM's) jurisdiction, as well as the No Action Alternative. The range of alternatives evaluated in the FEIS encompasses those to be considered by the ultimate decision maker (40 CFR 1502.2(e)). The evaluation in this section includes whether the alternative is reasonable and whether it would accomplish the purpose and need for the proposed action, as well as whether it would avoid or reduce adverse impacts caused by the proposed action. This screening-level analysis is intended to identify the range of reasonable alternatives, and the analysis also includes a resource-by-resource evaluation of environmental impacts of most of the potential alternatives.

The alternatives retained for detailed analysis in this section are evaluated further in Sections 4, 5, and 6 of this EIS. Section 4 provides a succinct description of the environment to be affected (40 CFR 1502.15), and the qualitative and, where applicable, quantitative information necessary to support a comparison among the alternatives (40 CFR 1502.16). Section 4 also identifies appropriate mitigation measures that are not included in the proposed action or the alternatives (40 CFR 1502.14). Section 5 provides an analysis of the cumulative effects associated with each retained alternative, and Section 6 evaluates the alternatives with respect to the irreversible and irretrievable commitment of resources, unavoidable adverse impacts, growth-inducing effects, and relationship between short-term uses and long-term productivity.

Regulatory Requirements

NEPA requires that the decision-makers and the public be fully informed of the impacts associated with the proposed action and alternatives. The intent is to make good decisions based on understanding environmental consequences, and to take actions to protect, restore, and enhance the environment. NEPA requires that an EIS consider all reasonable alternatives, those that are practical or feasible from the technical and economic standpoint and from using common sense, rather than simply desirable from the standpoint of the applicant (NEPA's 40 Questions, 1A).

Regulations promulgated by the Council on Environmental Quality require that an EIS rigorously explore and objectively evaluate all reasonable alternatives to a proposed action. Reasonable alternatives are those for which effects can be reasonably ascertained, whose implementation is not remote or speculative, that are feasible, effective, are not remote from reality, and those that are consistent with the basic policy objectives for management of the area. (40 CFR 1502.14; CEQ Forty Questions, No. 1A; Headwaters , Inc. v. BLM, 914 F.2d. 1174 (9th Cir. 1990).) Reasonable alternatives are dictated by the nature and scope of the proposed action. To determine reasonable alternatives, an agency must define the purpose and need of the proposal. The purpose and need of the proposed action is to be evaluated under a reasonableness standard. CEQ regulations state that an agency should include reasonable alternatives not within the jurisdiction of the lead agency (40 CFR 1502.14(c)). BLM interprets this to apply to exceptional circumstances and limits its application to broad, programmatic EISs that would involve multiple agencies. Because this is a site specific analysis and not a programmatic EIS, and for other reasons, these types of alternatives are identified but are not carried forward for full evaluation for BLM purposes in this FEIS.

For most actions, the purpose and need statement should be constructed to reflect BLM's discretion consistent with its decision space under its statutory and regulatory requirements. Thus, alternatives that are not within BLM jurisdiction would not necessarily be considered reasonable. Further, "[i]n determining the scope of alternatives to be considered, the emphasis is on what is 'reasonable' rather than on whether the proponent or applicant likes or is itself capable of carrying out a particular alternative..." (CEQ Forty Questions, No. 2a.)

Consideration of a No Action Alternative is mandated by NEPA. The No Action Alternative is the scenario that would exist if the proposed project was not constructed and no land use plan amendment was undertaken. Under a No Action Alternative, the land would continue to be managed by BLM under existing management as defined in the California Desert Conservation Area plan. This FEIS evaluates two other NEPA alternatives: in which the project would ultimately not be approved. One of the other alternatives would deny the project application, but the plan would be amended to allow other solar projects on the site, and the other alternative would deny the project application and the plan would be amended to prohibit solar or renewable project development at the site.

Alternatives Screening Methodology

To prepare the alternatives analysis, the BLM first developed an understanding of the project, identified the basic objectives of the project, and described its potentially significant adverse impacts. It then developed a list of potential alternative

technologies, locations, and configurations for the proposed action. Once this list was thought to be complete, BLM included a no action alternative, evaluated these potential alternatives to select those qualified for detailed evaluation, and provided the rationale for the elimination of the alternatives that were not retained for full analysis.

Based on this methodology, each potential alternative was evaluated to determine if it should be retained for detailed analysis. Alternatives were eliminated from detailed analysis if:

- It is ineffective (it would not respond to the purpose and need).
- It is technically or economically infeasible.
- It is inconsistent with the basic policy objectives for the management of the area (such as, not in conformance with the land use plan).
- Its implementation is remote or speculative.
- It is substantially similar in design to an alternative that is analyzed.
- It would have substantially similar effects to an alternative that is analyzed.

Data Sources

The information used to support the description of the proposed project and applicant-proposed mitigation measures in this EIS is contained within a variety of documents associated with the applicant's Application for Certification (AFC) to the Energy Commission. Under the Section III of the MOU in which BLM and the Energy Commission established the process for conducting this joint environmental review, the Data Adequacy and Discovery processes were led by the Energy Commission, based on BLM and Energy Commission staff review and evaluation of the AFC. Through this process, BLM's data needs to support the EIS were filled by BLM providing data needs to the Energy Commission, the Energy Commission including these needs in their own data requests to the applicant, and then the applicant providing the information in Data Response documents, which are considered supplements to the AFC. Therefore, although this EIS refers to these AFC and Data Response documents, which are typically Energy Commission-process documents, as the source of information, these documents are considered to comprise BrightSource's application materials, including the Plan of Development, in support of their BLM right of way grant application.

3.1.1 Project Objectives

Eight objectives are set forth by BrightSource in its AFC:

- To safely and economically construct and operate a solar generating facility in California capable of selling competitively priced renewable energy consistent with the needs of California utilities.
- To demonstrate the technical and economic viability of Bright Source's technology in a commercial-scale project.
- To locate the facility in areas of high solarity with ground slope of less than 5 percent.

- To minimize infrastructure needs and reduce environmental impacts by locating the plant near existing and planned infrastructure, including: CAISO transmission lines, a source of natural gas, and an adequate water supply.
- To avoid siting the plant in areas that are highly pristine or biologically sensitive (e.g., a Desert Wildlife Management Area).
- To locate the project consistent with existing land use plans. If on public land, to comply with the multiple use objectives of the FLPMA, which includes renewable energy development, and the objectives of the CDCA Resource Management Plan (RMP), which allows for solar energy development in some areas.
- To assist California in repositioning its generation asset portfolio to use more renewable energy in conformance with State Policy, including the policy objectives set forth in SB 1078 (California Renewable Portfolio Standard Program) and AB 32 (California Global Warming Solutions Act of 2006).
- To comply with provisions of the power sales agreement in negotiation for the first projects, to develop a project that can interconnect to a CAISO transmission line with the potential of achieving a commercial on-line date in 2010, but no later than 2011.

While the objectives of the applicant are of interest to BLM, BLM policy is clear that the BLM purpose and need dictates the range of alternatives and provides the basis for the eventual selection of an alternative.

3.1.2 Summary of Scoping and Screening Results

The development and evaluation of alternatives has included solicitation and consideration of comments from the public and other government agencies. The public scoping comment period allowed the public and regulatory agencies an opportunity to comment on the scope of the environmental document, comment on the alternatives considered, and to identify issues that should be addressed in the environmental review. The discussion below presents the key issues identified from the written and oral comments received on the ISEGS Project. The specific issues raised during the public scoping process are summarized as follows:

- Potential impacts to rare, declining, and listed species and their associated desert habitat and water use;
- Loss of desert tortoise habitat and insufficient land acquisition ratio proposed for mitigation;
- Concerns regarding the proposed relocation of desert tortoise;
- Impacts to bighorn sheep and disruption of wildlife movement;
- Cumulative and regional effects including those of other renewable energy projects in the region, the CDCA and in Nevada;
- Alternatives; reasonable alternatives should include, but are not limited to, alternative sites, capacities, and technologies;

- Potential glare and thermal plume effects on aircraft using airports at or around Jean, Searchlight and Pahrump as well as the proposed Southern Nevada Supplemental Airport;
- Impacts to groundwater quality from additional groundwater withdrawal and emergency wastewater discharges;
- Impacts to the Mojave National Preserve including the scenic viewshed, disruption of natural soundscape, potential for blocking or limiting access to recreation in Clark Mountain, light pollution, and air quality impacts;
- Indirect impacts of solar, wind, and geothermal energy projects resulting from new transmission lines and corridors.

Following publication of the DEIS in November 2009, the public and other agencies provided comments, including identification of other alternatives not considered in the DEIS; specific technical information regarding the feasibility of, or impacts associated with, certain alternatives; and statements of preference for various alternatives. This included the receipt of more detailed information regarding two alternatives which had been eliminated from detailed analysis in the DEIS, the Reduced Acreage Alternative and the I-15 Alternative. This additional information suggested that one or both of these alternatives could be technically and economically feasible, could achieve BLM's purpose and need for the proposed project, and could avoid impacts to sensitive resources in the northern part of the proposed project area. As a result of these comments, the analysis provided in this section was re-evaluated and revised. The revision has resulted in the following actions:

- Revision of the original conclusion in the DEIS to eliminate the Reduced Acreage Alternative and I-15 Alternative from more detailed evaluation. The detailed evaluation of these two alternatives was provided in the Supplemental Draft EIS, published on April 17, 2010, and is provided in **Sections 3.2.2** and **3.2.3** below.
- Revision of the introduction to this section, to provide a more explicit description of how the alternatives evaluation process is linked to requirements under NEPA.
- Modification of BLM's objectives for the project, so that the consideration of alternatives is not constrained by BLM's jurisdiction or the applicant's construction schedule.
- The addition of technical information, where appropriate, in the discussion of specific alternatives.
- The addition and screening evaluation of two alternatives not considered in the DEIS.

3.2 Alternatives Retained for Detailed Evaluation

Based on the screening evaluation, four alternatives have been retained for more detailed analysis and evaluation in Section 4. These alternatives include:

- Proposed Action
- Mitigated Ivanpah 3 Alternative
- Modified I-15 Alternative

- No Action Alternative

To support the detailed environmental analysis of these alternatives, the following subsections provide a detailed description of the facilities, construction procedures, operational procedures, and decommissioning procedures that would be associated with each of these alternatives.

3.2.1 Proposed Action

The applicant for this project consists of Solar Partners I, LLC; Solar Partners II, LLC; Solar Partners IV, LLC; and Solar Partners VIII, LLC (applicant), which are subsidiaries of BrightSource Energy, Inc. On August 31, 2007, the applicant filed an AFC with the California Energy Commission (Energy Commission) seeking permission to develop the ISEGS project. The applicant filed four ROW applications with BLM for the ISEGS project on August 29, 2007. BrightSource Energy, Inc. (BrightSource) is a technology and development company and the parent company of the four limited liability companies. The Applicant would use BrightSource's solar thermal technology to develop ISEGS. The four ROW applications filed by BrightSource are for projects that are designed and intended to operate while sharing certain common areas and facilities. The analysis contained in the EIS applies to the proposed project as a whole. The AFC filed with the Energy Commission and the four applications to BLM include an application for shared facilities including a substation, administration and maintenance buildings within a construction logistics area, and separate applications for the three power plants. The applicant's development plans have been updated several times since filing its original AFC and ROW applications with the most substantial revisions summarized as follows in **Table 3.1**.

Table 3.1
Summary of Applicant's Updates to its ISEGS Development Plans

Date	Reference Document	Project Area	Number of Heliostats	Other Revisions to Proposed Project
AFC and ROW Application				
8-31-07	AFC Section 2.1, page 2-2 (CH2M Hill 2007)	3,400	272,000	The original heliostat proposal consisted of a single 7 square meter (m^2) mirror hung in a landscape orientation;
Revision 1 – Optimized Project Design				
5-9-08	Data Response 1D, page 4 (CH2M Hill 2008d)	3,700	214,000	1. Reduced the total number of heliostats from 272, 000 in the single-hung to 214,000 in the double-hung mirror configuration (reducing from 68,000 to 55,000 heliostats each for Ivanpah 1 and 2, and reducing from 136,000 to 104,000 heliostats for Ivanpah 3); 2. Doubled the heliostat mirror surface area from 7 to 14 m^2; 3. Reduced the number of power towers associated with Ivanpah 1 and 2 from three to one, and increased the height of the power tower from 262 to 459 feet; 4. Moved the project boundaries out an additional 250 feet on the perimeters within the surveyed areas to increase the spacing between the larger heliostats.
Revision 2 – Revision to Site Plans & Stormwater Drainage Design				
6-10-08	Data Response 2A (CH2M Hill 2008e)	4,065	214,000	1. Revised stormwater drainage plans from pass-through to active management including large detention ponds and conveyance features; 2. The addition of stormwater detention ponds resulted in an increased project area from 3,700 to 4,065 acres; 3. Proposed a high level of grading and ground disturbance.
Note: Because the revised plans were not supported with underlying site characterization assumptions and stormwater calculations, BLM and the Energy Commission requested supporting information from the applicant. This led the applicant to reconsider its site plans and to develop Revision 3.				
Revision 3 – Revision to Site Plans & Stormwater Drainage Design				
5-18-09	Data Response 2I (CH2M Hill 2009a)	4,073	214,000	1. Revised stormwater drainage plans again, eliminating large detention basins and conveyance features, and relying on existing ephemeral drainages; 2. Proposed Low Impact Development (LID) approach to minimize ground disturbance and to retain as much vegetation as possible; Vegetation would be cut and maintained to a height of 12 – 18".
Note: The Power Purchase Agreement would allow utilization of up to 270,000 heliostats.				

Proposed Project Location and General Description

The applicant has proposed to locate the ISEGS project in the Mojave Desert, near the Nevada border in San Bernardino County, California, on land administered by the BLM. The proposed project site is located 4.5 miles southwest of Primm, Nevada, and 0.5 mile west of the Primm Valley Golf Club, which is located just west of the Ivanpah Dry Lake. Access to site is from the Yates Well Road Interchange on Interstate 15 (I-15) via Colosseum Road. Please see **Figure 3.1** and **Figure 3.2**.

The proposed ISEGS project would be a development of three solar concentrating thermal power plants, which are comprised of fields of heliostats (elevated mirrors guided by a tracking system) focusing solar energy on boilers located on centralized power towers. Each heliostat tracks the sun throughout the day and reflects the solar energy to the receiver boiler. In each plant, one Rankine-cycle reheat steam turbine receives live steam from the solar boilers and reheat steam from the solar reheater. The applicant proposes to develop the ISEGS project as three power plants in separate and sequential phases that are designed to generate a total of 400 MW of electricity. Ivanpah 1 and 2 would each have an electrical generation capacity of 100 MW, and Ivanpah 3 a capacity of 200 MW. Shared facilities consisting of the substation, administration and maintenance buildings would be developed during construction of the first power plant in the Construction Logistics area between Ivanpah 1 and 2.

Proposed Right-of-Way Acreage Description

As noted above in **Table 3.1**, since filing the AFC and ROW Application, the applicant's proposed project plans have been updated for design optimization and for two revisions associated with stormwater management approaches. Associated with the Optimized Project Design adjustment of power plant boundaries, the applicant proposed that the western Ivanpah 3 boundary line be moved to exclude the existing mining claim at the limestone outcrop to the west of the project site (CH2M Hill 2008d). The acreages of long term (life of the facility) and temporary disturbances associated with the applicant's final conceptual plans are summarized as follows in **Table 3.2**.

Table 3.2
Long Term and Temporary Disturbance of BLM Land (acres)

Facility	Acres
Long Term Disturbance	
Ivanpah 1	913.5
Ivanpah 2	920.7
Ivanpah 3	1,836.3
Substation	16.1
Administration/warehouse & parking	8.9
Southwest Gas Company's Kern River Gas Line Tap Station (100' X 150')	0.3
Southwest Gas Company's Metering Set for Ivanpah 1 & 2 (20' X 40')	0.02
Groundwater Wells [10' x 10' area for 2 supply wells and 1 monitoring well)	0.01
Transmission Towers (8' x 8' area every 750 feet)	0.01
Linear Facilities (Colosseum Road, Gas, Water & Transmission Lines)	16.9
Subtotal – Long Term Disturbance	**3,712.7**
Temporary Disturbance	
Main Construction Laydown Area	260.0
Equipment Laydown and Wash Area	21.5
Contractor Trailers	20.1
Colosseum Road Improvement (100-ft wide construction corridor from Golf Club to Ivanpah 2, less asphalt road)	12.4
Southwest Gas Company's construction laydown	5.0
Gas line (75' wide construction disturbance from tap to Ivanpah 3 for 2,011 feet)	2.9
Southwest Gas Company's Kern River Gas Line tap construction area (200' x 200')	0.9
Adjustment for Roads	(1.8)
Subtotal – Temporary Disturbance	**321.0**
Existing Transmission Line Corridor (within Construction Logistics Area)	38.9
Total ISEGS Project Land Use	**4,073**
Overview of ISEGS Project Land Use	
Ivanpah 1	**913.5**
Ivanpah 2	**920.7**
Ivanpah 3	**1,836.3**
Construction Logistics Area	**377.5**
External Features to ISEGS Project Boundaries (Roads & Natural Gas Line)	**24.5**
Total ISEGS Project Land Use	**4,073**

Source: CH2M Hill 2009a

The proposed project would cause long term disturbance of about 3,713 acres, temporary disturbance of 321 acres, and including the existing transmission line corridor of about 39 acres within the Construction Logistics area, ISEGS would utilize about 4,073 acres (6.4 square miles) of federal land managed by BLM. Please see **Figure 3.3**.

Solar Power Plant Equipment and Facilities

Heliostats

Each heliostat would be configured with two mirrors hung in the portrait position. Each mirror would be 7.2 feet high by 10.5 feet wide, providing a reflective surface of 75.6 square feet (7.04 m^2) per mirror or 14.08 m^2 per heliostat (See **Figure 3.4**). The overall height of the heliostats would be about 12 feet. The heliostats would be connected with communication cables strung aboveground between each heliostat. The communications cables would transmit signals from a computer-programmed aiming control system that would direct the movement of each heliostat to track the movement of the sun (CH2M Hill 2009a). Heliostats in the northern section of the heliostat array have the highest solar collection efficiency because the sun is predominantly in the southern horizon, and they have the most direct reflection angle to the power towers (most perpendicular to the face of the mirror as it reflects to the power tower). Conversely, heliostats in the southern section of the heliostat array have the lowest solar collection efficiency. The eastern sector of heliostats is more valuable than the western sector because afternoon energy collection during on-peak utility hours, is more valuable than morning energy collection during partial-peak or off-peak hours. In consideration of the relative efficiency of heliostats depending on their orientation to the power tower, the applicant indicated that the number of heliostat rows increased from least to greatest according to this efficiency in order of southern, western, eastern and northern sectors respectively (CH2M Hill 2007, page 2-5).

The heliostats would normally travel by day within the range of the stowed position with the mirrors facing vertically upwards to the track position at some angle higher than facing horizontally. At night, the heliostats would normally be maintained in the stowed position. Approximately every 2 weeks, the mirror would travel from the stowed to the wash position for night-time mirror washing with the mirrors facing horizontally. Daily positioning of the heliostats would occur as follows:

1. At dawn, when likely all heliostats would be moved from stowed to track position to begin reflecting solar energy to the receiver/boiler;
2. During mid-day, when some heliostats would be returned to the stowed position to not exceed solar energy capacity limits of the receiver/boiler;
3. During late-afternoon or evening, when the stowed heliostats would be returned to track position to increase solar energy directed to the receiver/boiler as the sun's position begins to lower in the western horizon and be less optimal for energy production;
4. At nightfall, when all heliostats would be returned to the stowed position or to the wash position for mirror washing at a frequency of about once every two weeks (CH2M Hill 2009a).

The number of heliostats described under the Optimized Project Design (55,000 each for Ivanpah 1 and 2, and 104,000 for Ivanpah 3) represents the maximum number of heliostats that would be constructed; however, all of them may not be constructed. Although the number of heliostats within Ivanpah 1 and 2 have been reduced about 19.1 percent, the permitted surface area of the heliostats would increase about 61.8 percent from about 5,283,600 square feet (~490,960 square meters) to about 8,547,000

square feet (~794,200 square meters). In Ivanpah 3, with a 23.5 percent reduction in the number of heliostats, the reflective surface area permitted would increase about 52.9 percent from about 10,567,200 square feet (~981,920 square meters) to about 16,161,600 square feet (~1,501,760 square meters). This surface area increase would result in additional electricity production (MW-hours) on an annual basis with no change in installed capacity (MW) and with only a small amount of additional land. Under the Optimized Project Design, the applicant has not proposed any changes in the steam turbine-generators and interconnection capacity (CH2M Hill 2008d).

The applicant's proposed increase in heliostat mirror surface area associated with the Optimized Project Design led the applicant to also propose an increase in total ISEGS area of about 300 acres and extension of the project boundaries of the three power plants by 250 feet along each perimeter. The proposed increase in the heliostat mirror area is a result of the following considerations:

1. The double-hung mirror configuration is taller than the single-hung orientation, and the resulting increase in shadowing requires greater distance between the arrays, with the result that the last rows are farther from the towers. Energy collection is less efficient the farther the mirrors are from the tower receivers, so additional heliostat surface area (approximately 5 to 10 percent) is needed to achieve the same annual energy output.
2. The Applicant has also sought to increase the annual electricity production from the same facility by adding heliostat surface area, an efficiency gain made possible by the double mirror configuration. Daily solar output is less in the early morning hours and later afternoon hours. Adding heliostat surface area results in increased heat to the receivers and increased steam to the steam turbine during these otherwise lower production hours. During the peak hours of the day, these additional mirrors will be placed on standby since the steam turbine remains the same size and cannot accept additional steam. The double-hung heliostats are more compact and use less land than the single-hung heliostats, which creates the opportunity for additional heliostat surface area within the same land area. This means that the land is more productive, and that the impacts per kilowatt hour (kWh) of production are less.
3. Finally, a portion of the increased heliostat surface area to be licensed ensures that the project will be able to meet its contractual output requirements even if the solar resource is less than forecasted. The final rows of heliostats may not be necessary. Pending the results of actual performance during plant operation, a decision will be made on whether or not to install the additional heliostats. Thus, the project optimization represents the maximum number of heliostat structures and heliostat surface area (CH2M Hill 2008d).
4. To ensure that installed heliostats are stable with respect to water erosion at their base and pressure applied by wind, the applicant has conducted, and continues to conduct, heliostat installation and stability testing. This has included several phases of field testing in August 2009, February 2010, and June 2010. The testing has included the use of different drilling equipment and methods to identify feasible and efficient means to install the pylons for the heliostats, and stability tests on the installed pylons to determine the necessary type of pylon

configuration and depth of insertion to address the potential effects of wind pressure and water erosion on the heliostats.

Solar Power Towers

Another result of the applicant's Optimized Project Design was to revise the number and height of the solar power towers for Ivanpah 1 and 2. In the original application, Ivanpah 1 and 2 would have required three power tower receivers and one solar reheater; each would have stood 262 feet high. The revised site design incorporated only one power tower for each Ivanpah 1 and 2, with an increased height to 459 feet, consistent with the height of the five power towers for Ivanpah 3. The decrease from three power towers to one each for Ivanpah 1 and 2 also resulted in a change in the orientation of the heliostats as they are generally arranged concentrically around the power tower. Ivanpah 3 would have five power tower receivers situated with one in each quadrant, and one central to the Ivanpah 3 site, each with a height of 459 feet. The central power tower of Ivanpah 3 would include the power block with one steam turbine-generator supplied superheated steam by the five power tower boilers. Steam from the four quadrant solar power tower boilers would be conveyed by above-ground pipeline.

The solar power tower is a metal structure designed specifically to support the boiler and efficiently move high-quality steam through a steam turbine-generator (STG) at its base. The power tower support structure would be about 120 meters high (approximately 393 feet). The receiving boiler (which sits on top of the support structure) would be 20 meters tall (approximately 66 feet) including the added height for upper steam drum and protective ceramic insulation panels (See **Figure 3.5**). Overall, each of the seven power towers would have a height of 140 meters (approximately 459 feet). Additionally, a Federal Aviation Administration (FAA)-required lighting and a lightning pole would extend above the top of the towers approximately 10 feet. The height of the power towers allows heliostats from significant distances to accurately reflect sunlight to the receiving boiler. The receiving boiler is a traditional high-efficiency boiler positioned on top of the power tower. The boiler converts the concentrated energy of the sun reflected from the heliostats into superheated steam. The boiler's tubes are coated with a material that maximizes energy absorbance. The boiler has steam generation, superheating, and reheating sections and is designed to generate superheated steam at a pressure of 160 bars and a temperature of 550 degrees Celsius (°C).

Power Block

Each solar power plant (Ivanpah 1, 2 and 3) would have a power block located in the approximate center of the power plant area. The power block would include a solar power tower, a receiver boiler, a STG set, air-cooled condensers, and other auxiliary systems. Each of the three solar-thermal plants would include the following equipment and facilities in their power block:

- natural gas-fired start-up boiler;
- the air emission control system for the combustion of natural gas in the start-up boiler;
- steam turbine generator;
- air-cooled condenser;

- auxiliary equipment (feed water heaters, a de-aerator, an emergency diesel generator, diesel fire pump, etc.);
- a raw water tank with a 250,000 gallon capacity, to supply water for plant use and fire fighting; and a
- water treatment system.

Each of the three power plants includes a partial-load, natural gas-fired steam boiler, which would be used for thermal input to the turbine during the morning start-up cycle to assist the plant in coming up to operating temperature more quickly. The boiler would also be operated during transient cloudy conditions, in order to maintain the turbine on-line and ready to resume production from solar thermal input, after the clouds pass. After the clouds pass and solar thermal input resumes, the turbine would be returned to full solar production and the boilers would be shut down. The solar field and power generation equipment are started up each morning after sunrise and insolation build-up, and shut down in the evening when insolation drops below the level required to keep the turbine on line. The natural gas-fired boilers would not be big enough to allow operation for sustained periods of reduced sunlight (i.e., on cloudy days or at night). Heat input from natural gas would not exceed 5% of the heat input from the sun, on an annual basis. The natural gas-fired boiler use would not exceed four hours on any given day, and average use would be less than one hour per operating day. Solar heat would be used to keep each boiler in hot standby mode, capable of responding to demand on short notice. No fuel would be fired while a boiler is on hot standby. Please see **Figure 3.6** and **Figure 3.7**.

Power Output

The nominal generation values for power plants are general estimates that can represent a class or size of generators without referring to a specific model and design specification. The proposed project would have a nominal generation value of 400 MW. The actual energy output of the facility at any point in time can be influenced by several factors, including the amount of cloud cover, sun angle (as influenced by time of day or time of year), condition of mirrors (clean versus dusty), and plant-related electrical loads.

When a cloud passes over the facility it may or may not impact generation. There are many factors to consider including, time of day, amount of clouds, total cloud cover, ambient temperature, etc. Significant cloud cover in the morning may have a significant impact on generation since there will be a higher percentage of mirrors required to reach design pressure and temperature. A single cloud in the afternoon may not have a significant impact since a large percentage of mirrors will be in standby position. It is possible that retasking mirrors or adding steam heat from the auxiliary boiler could mitigate a decline in generation.

The gross generation is the amount of power at the generator terminals. It does not account for the electrical loads required to actually run the power station. Gross generation is an estimate of the maximum amount of generation that can be generated at the generator terminals without consideration for power requirements to run the plant. Net generation is the amount of power that the power station can send over the transmission system for use by customers. This generation figure takes the gross

generation and subtracts all the loads required to run the power station. Loads include the power required to operate pumps, coolers, computer systems, motor operated valves, and heliostat power units. Bechtel Power Corp estimates the house power for each of the units to be approximately 5.5 MW. Therefore, the net generation for ISEGS is as follows:

Table 3.3
Gross and Net Power Generation from Proposed Project

Unit	Gross Generation	House Load Required to run the plant	Net Generation
Ivanpah 1	126	5.5	120.5
Ivanpah 2	133	5.5	127.5
Ivanpah 3	133	5.5	127.5
ISEGS Total	392	16.5	375.5

Related Equipment and Facilities

The following related equipment and facilities described in this section are included as part of the proposed action. All would be constructed, operated and maintained by the one or more of the individual applicants except for the Ivanpah Substation. The Ivanpah Substation would eventually be constructed, operated and maintained by the transmission line owner, Southern California Edison (SCE) but is included in this analysis because it is directly connected to this proposed action.

Natural Gas Pipeline

The solar heat used in the boiler (steam) process would be supplemented by burning natural gas to heat a partial load steam boiler when solar conditions are insufficient. Each power plant within the project would include a small package, natural gas-fired start-up boiler to provide additional heat for plant start-up and during temporary cloud cover. Natural gas would be supplied to the site through a new, proposed six-mile long distribution pipeline ranging from 4 to 6 inches in diameter. From the Kern River Gas Transmission pipeline, the pipeline would extend 0.5 miles south to the northern edge of Ivanpah 3. The ROW area required for this section of the pipeline would be 75 feet wide and 0.5 miles long. The line would then run east along the northern edge, and then south along the eastern edge, of Ivanpah 3 to a metering station near the southeast corner of Ivanpah 3. From there, a supply line would extend northwest into the Ivanpah 3 power block. The main pipeline would continue along the eastern edge of Ivanpah 2 to another metering station at its southeastern corner. Again, a branch supply line will extend northwestwards into the center of the Ivanpah 2 power block. From that station, the pipeline would follow the paved access road from Colosseum Road past the administration/warehouse building to the Ivanpah 1 power block. The extensions of the pipeline into the power blocks would be located within the project fenceline. However, the sections of pipeline along the northern boundary of Ivanpah 3, and then the eastern boundaries of Ivanpah 3 and 2, would be located outside of the fenced heliostat area, in order to allow access to the pipeline for maintenance.

A new tap metering station of approximately 100 feet by 150 feet in area would be located at the Kern River Gas Transmission Line. The tap station would measure and

record gas volumes. Facilities would be installed at the tap station to regulate the gas pressure, to remove any liquids or solid particles, and facilitate the use of pigs for pipeline inspection and cleaning. Once measured this tap would be a custody transfer point in the sale of natural gas to the applicant. In addition to the tap station, separate metering sets would be installed for each of the power plant sites. The three metering sets would measure and record gas volumes utilized at each individual power plant. As part of the Optimized Project Design, the location of the proposed gas line was re-routed along the west side of Ivanpah 2 and 3 to provide the applicant access to the line for service/repair work (CH2M Hill 2008d). Please see **Figure 3.8**.

Air Pollution Control

Air pollution emissions from the combustion of natural gas in the start-up boiler would be controlled using best available control technology. Each boiler would be equipped with low-Nitrogen Oxide (NOx) burners for NOx control. Carbon Monoxide (CO) would be controlled using good combustion practices such as burner and control adjustment based on oxygen continuous monitoring, operator training and proper maintenance. Particulate and Volatile Organic Compounds (VOC) emissions will be minimized through the use of natural gas as the fuel. To ensure that the systems perform correctly, continuous emission monitoring for NO_x and CO would be performed. Boiler use would not exceed four hours on any given day, and average boiler use would be less than one hour per operating day.

Water Supply and Discharge

The facilities would require a water source to support operations, including process water consisting of make-up water for the steam system and wash water for the heliostats, and potable water for domestic water needs. Groundwater would be supplied from one of two wells that would be constructed at the northwest corner of Ivanpah 1, just outside the perimeter fence but within the construction logistics area. Each of the three power blocks would be connected to the groundwater wells by underground water pipelines. The applicant estimates the amount of groundwater pumped would not exceed a maximum of 100 acre-feet per year (afy) for all three solar plants combined, which would primarily be used to provide water for washing heliostats (mirrors) and to replace boiler feed water blow-down. The applicant has estimated that average annual water demands for all project operating needs would be on the order of 77 afy allocated as shown in **Table 3.4.**

Table 3.4
Annual Average ISEGS Water Demands (acre-feet/year)

Facility	Mirror Wash	Boiler Makeup	Total
Ivanpah 1	11	7	18
Ivanpah 2	11	7	18
Ivanpah 3	21	16.5	37.5
Potable Water			2.9
Total	**43**	**30.5**	**76.4**

The quality of groundwater would be improved using a treatment system for meeting the requirements of the boiler make-up and mirror wash water. Water treatment equipment would consist of activated carbon filters, de-ionization media, and a mixed-bed polisher. Each power plant would have a 250,000 gallon raw water storage tank. Approximately 100,000 gallons would be usable for plant process needs and 150,000 gallons would be reserved for fire protection. Demineralized water would be stored in a 25,000-gallon demineralized water storage tank. Boiler feedwater make-up water will be stored in another 25,000-gallon tank.

Because the BLM expressed concern that the two original proposed well locations would interfere with monitoring and regulation of the Primm Valley Golf Club Colosseum wells, the applicant relocated the proposed wells 4,250 feet south of their original location to the northwest corner of Ivanpah 1. This would eliminate the need for a separate access road and minimize land disturbance. In addition to supply wells, a monitoring well would be installed between the Ivanpah supply wells and the Primm Valley Golf Club wells (CH2M Hill 2008d).

Fire Protection

The fire protection system would be designed to protect personnel and limit property loss and plant downtime in the event of a fire. The primary source of fire protection water would be the 250,000 gallon raw water storage tank to be located in each power block. Approximately 100,000 gallons would be usable for plant process needs and 150,000 gallons would be reserved for fire protection. An electric jockey pump and electric motor-driven main fire pump would be provided to increase the water pressure to the level required to serve all fire fighting systems. In addition, a backup diesel engine-driven fire pump would be provided to pressurize the fire loop if the power supply to the electric motor-driven main fire pump fails. All fire protection systems would be focused on the power blocks, administration/warehouse building, and other areas of active operations. The project would not include any specific facilities to address potential wild fires.

Access Roads and Maintenance Paths

Access to the project site would occur from the Yates Well Road exit from I-15 to Colosseum Road. Colosseum Road, currently a dirt road, would be paved to a 30-foot wide, two lane road for a distance of 1.9 miles from the Primm Valley Golf Club to the facility entrance. A portion of the current route of Colosseum Road would be incorporated into the Ivanpah 2 plant site, so the road would be diverted for a distance of 1.66 miles. A segment of 1.2 miles would be re-routed around the southern end of Ivanpah 2 and paved, and then an additional 0.46 mile, 12-foot wide dirt segment would link the paved road to the existing dirt road to the west of Ivanpah 2. Please see **Figure 3.9**.

Within the heliostat fields, maintenance paths would be established concentrically around the power blocks to provide access for heliostat washing and maintenance. The paths would be established between every other row of heliostats. An additional maintenance path would be established on the inside perimeter of the boundary fence. Within each unit, a diagonal dirt road would be established to provide access to the concentric maintenance paths and the power blocks.

Off-road, recreational vehicle trails currently authorized by BLM which run through the proposed project site would be re-located outside of the project boundary fence. The project boundary would overlap three existing open route designations; route 699226, route 699198, and a segment of Colosseum Road. Approximately 7,200 feet of route 699226 would be cut off by the Ivanpah 3 facility and another 6,500 feet of route 669198 would be cut off by the Ivanpah 2 facility . An estimated 5,000 feet of the Colosseum Road would also be cut off by the Ivanpah 2 facility. The impacts on traffic access to these routes is readily mitigated by the re-direction of roads around the facility and realignment of Colosseum Road through the logistics area between Ivanpah 1 and 2. The re-direction of roads around the perimeter of each facility is addressed in the applicant's proposed action as they require the perimeter access routes to maintain security and desert tortoise fencing. The perimeter routes would be constructed, operated and maintained by the applicant but would remain open to public use and travel. Colosseum Road would also remain open for public travel where it is rerouted through the construction logistics area. The closed portions of the three routes would be removed from the list of open routes on BLM's Off Highway Vehicle designation. The replacement routes would be part of the ROW grant for the project and would remain open and maintained by the applicant for the life of the facility. The redirected routes and Colosseum Road would be designed and constructed to minimize damage to soil, watershed, vegetation and air resources. These routes would be monitored by the applicant to avoid disruption to wildlife resources.

Construction Logistics Area, Substation, and Administrative Complex

The applicant proposes using a temporary construction logistics area for staging contractor equipment and trailers, assembly yards, storage of materials, equipment laydown and wash area, construction personnel parking, and assembly areas for heliostats. The construction logistics area would be located between Ivanpah 1 and 2 and would comprise approximately 377.5 acres. Following project construction, the majority of the area would undergo site closure, rehabilitation, and revegetation as described in the Draft Closure, Revegetation, and Rehabilitation Plan (CH2M Hill 2009b). A 40-acre portion of this area would be used as a botanical succulent storage and stockpiling area.

The administrative complex and substation area would be located within the perimeter of this 377.5 acre logistics area. The administrative complex, comprising 8.9 acres, would be used as a common area to support all three solar facilities. These facilities would include an administration/warehouse building and asphalt-paved parking lot. Please see **Figure 3.10**.

Fencing

The project area would be surrounded by security fence, which would be constructed of 8-foot tall galvanized steel chain-link, with barbed wire at the top as required. The security fence would surround the outer perimeter of each power plant, the substation, and the administrative complex. Tortoise barrier fence would also be installed in accordance with the Recommended Specifications for Desert Tortoise Exclusion Fencing (USFWS 2005). The tortoise fence would consist of 1-inch horizontal by 2-inch vertical galvanized welded wire. The fence would be installed to a depth of 12 inches,

and would extend 22 to 24 inches above the ground surface and integrated with the security fence.

In addition to use of the proposed right-of-way area, the applicant proposes some project-related maintenance and monitoring activities to occur outside of the project perimeter fence. As presented in the applicant's Revised Project Description, a variety of project-related activities must be conducted outside of the project security fence, including:

- Inspection and maintenance of security fence and tortoise exclusion fence;
- Underground utility repairs;
- Installation of new underground pipeline;
- Maintenance of drainage systems, including removal of debris and sediment; and
- Installation of new stormwater drainage systems (CH2M Hill 2009a).

In addition to these activities, a roadway would need to be maintained outside of the project fence to allow vehicle and equipment access for these activities. The Revised Project Description does not define specific locations or acreages for these activities. Instead, it states that some activities, such as installation of new stormwater drainage systems, could disturb greater than one acre, with no upward bound placed on the projected disturbance.

Throughout most of the proposed right-of-way area, the applicant proposes that the security and tortoise exclusion fence be inset from the right-of-way boundary to allow access for these activities. These inset distances range from 65 feet where natural gas pipeline is buried to 12 feet in areas without pipeline. In some preliminary drawings submitted by applicant, it is unclear if the fence is inset sufficiently to allow access for proposed maintenance and monitoring activities. Applicant has also stated the potential area of disturbance associated with new stormwater drainage systems is defined as "one acre or more". Since the buffer distance between the security fence and the right-of-way boundary in other areas is as narrow as 12 feet, the development of stormwater drainage systems that exceed one acre in size would likely extend outside of the right-of-way boundary and would require supplemental environmental review and analysis and appropriate land use authorizations and permits (CH2M Hill 2009e, Drainage, Erosion and Sediment Control Plan Figure 15 – Access Roadway Plan). Please see **Figure 3.9**.

Transmission System Interconnection and Upgrades

Onsite Transmission Facilities

The ISEGS project would deliver power from Ivanpah 1, 2 and 3 via three separate 115-kilovolt (kV) transmission generation tie lines to a new Ivanpah substation that would be owned and operated by SCE and located in the common construction logistics area between Ivanpah 1 and 2. The new Ivanpah substation would be about 850 feet by 850 feet and located on a little over 16 acres. Each of the power plants would have a switchyard with a step-up transformer to increase the 13.8 kV generator output voltage to 115 kV. The ISEGS #1 115 kV generator tie line would be approximately 5,800 feet long and supported by single-pole structures. The ISEGS #2 and #3 generator tie lines

would share the same poles for the last 1,400 feet of their routes before they interconnect to SCE's Ivanpah Substation. The ISEGS #2 generator would connect to the Ivanpah Substation through a 115kV, 3,900 feet-long single circuit generator tie line built with the last 1,400 feet merged with the ISEGS #3 generator tie line to create a 1,400 feet long, overhead double circuit line prior to entering the Ivanpah Substation. The ISEGS #3 generator tie line would be an approximately 14,100 feet long, single circuit, 115 kV line and would merge into a 115kV double circuit with the ISEGS #2 generator tie line. In accordance with the Interconnection Agreement between the applicant and SCE, the existing Eldorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115-kV line would loop in and out through the newly built Ivanpah Substation to interconnect the project to the SCE transmission grid. This 115-kV line is currently aligned between the Ivanpah 1 and 2 sites along a northeast-southwest right-of-way.

Eldorado – Ivanpah Transmission Line

In order to accommodate the total anticipated 1,400 MW load generation by ISEGS and five other planned renewable energy generation projects in the region, the California Independent System Operator (California ISO) has identified approximately 36 miles of transmission line within California and Nevada that would need to be upgraded from 115 kV to 230 kV. This upgrade of SCE's existing 115-kV line is known as the Eldorado-Ivanpah Transmission Project (EITP). Because the EITP is to be implemented by a different applicant and would occur whether or not the ISEGS proposed project were implemented, it is independent of the proposed ISEGS project, and is currently undergoing a separate environmental review under a joint Environmental Impact Report (EIR) and EIS by the California Public Utilities Commission (CPUC) and BLM. However, since the two projects would be directly linked, additional detailed information regarding the scope of the EITP is provided in the following paragraphs. In the ISEGS FSA/DEIS, the EITP was considered a reasonably foreseeable future project because the proponent had not developed the project in enough detail to begin a joint analysis with ISEGS. That detailed project information on EITP is now available, so EITP is considered to be a cumulative action in this FEIS. The evaluation of cumulative impacts associated with the combination of the proposed ISEGS project with the EITP, presented in Section 5, is supported by additional information that was presented in the Draft EIR/EIS for the EITP, which was published on May 7, 2010. If the reader should desire additional detailed information regarding the EITP project, that information is available in the Draft EIR/EIS.

To accomplish the transmission upgrade, SCE has filed an application for a Certificate of Public Convenience and Necessity from the CPUC. They have also filed an application for a ROW from the BLM. The CPUC is serving as the lead agency for CEQA compliance for the approximately five-mile portion of the transmission line work within California. BLM is serving as the lead agency for National Environmental Policy Act compliance. BLM and CPUC published a NOA of the Draft EIS/EIR on May 7, 2010, six months after the NOA was published for the Ivanpah SEGS proposed project on November 10, 2009. The 45-day public comment period extended through June 21, 2010, and will be followed by publication of the Final EIS/EIR prior to BLM reaching a decision on the right-of-way grant.

The EITP would involve several types of transmission upgrades to connect renewable energy generated in the Ivanpah Valley area to the transmission grid controlled by the

CAISO. A new 230/115- kV Ivanpah Substation, a double-circuit 230-kV transmission line between the existing Eldorado Substation and the Ivanpah Dry Lake area to replace the existing 115-kV line, and a telecommunication system would be constructed. The reliability of the existing 115-kV transmission line would also be improved in compliance with the North American Electric Reliability Corporation (NERC) and Western Electricity Coordinating Council (WECC) planning criteria, the NERC reliability standards, and the applicant's standards.

The core project would include the transmission upgrades and associated transmission infrastructure and the alternatives included in the application submitted by SCE to the CPUC and the BLM. SCE proposes to construct, operate, and maintain new and upgraded transmission facilities to deliver electricity from several solar energy facilities proposed to be built in the Ivanpah Valley area. The upgraded transmission lines would extend approximately 35 miles from southern Clark County, Nevada, to northeastern San Bernardino County, California. Approximately 28 miles of the project are in Nevada and 7 are in California. The proposed EITP project would include the following components:

- Powerlines
  - Eldorado–Ivanpah Transmission Line – A new double-circuit 230-kV transmission line, approximately 35 miles long, would be constructed between the existing Eldorado Substation in Nevada and the proposed Ivanpah Substation in California. It would replace a portion of the existing 115-kV transmission line that runs from Eldorado through Baker, Cool Water, and Dunn Siding to Mountain Pass. The existing 115-kV transmission line that runs west of the proposed Ivanpah Substation to Mountain Pass Substation would remain unchanged.
  - Subtransmission Line – A proposed 600- to 800-foot-long addition to an existing 115-kV subtransmission line from a connection point on the existing Eldorado–Baker–Cool Water–Dunn Siding–Mountain Pass 115-kV line would connect the proposed Ivanpah Substation to the existing 115-kV subtransmission system.
  - Distribution Lines – A 1-mile extension of the existing Nipton 33-kV distribution line would be constructed with underground circuitry to provide light and auxiliary power to the proposed Ivanpah Substation. In addition, a new 4,300-foot segment from the existing Nipton 12-kV distribution line would be built to provide power to a proposed microwave telecommunications site.
- Substations
  - Ivanpah Substation – The proposed substation would be located in California near Primm, Nevada, and would serve as a connector hub for solar energy generated in the Ivanpah Valley area. The substation would include a mechanical and electrical equipment room and a microwave tower.
  - Eldorado Substation – Changes inside the existing Eldorado Substation would be made to accommodate the new Eldorado–Ivanpah 230-kV transmission line.

- Telecommunication System
  - Existing overhead ground wire would be replaced with optical ground wire on an approximately 25-mile section of the existing Eldorado–Lugo 500-kV transmission line.
  - A 4.8-mile-long underground duct from the Eldorado–Lugo 500-kV transmission line to a proposed communication site in Nipton, California, would be installed.
  - A microwave path (approximately 12 miles) between Nipton and the proposed Ivanpah Substation would be installed that would consist of two 180-foot-tall communication towers.
  - A communications room would be installed in the mechanical and electrical equipment room (MEER) at the new Ivanpah Substation to house communication equipment.
  - Telecommunication equipment would be installed at the Eldorado Substation.

Construction of the EITP components would also involve the temporary use of areas and facilities on public and private lands for equipment and material storage, structure assembly and erection, conductor pulling and tensioning, helicopter landing, and other uses.

Telecommunications Facilities

The proposed Ivanpah Substation would also require that new telecommunication infrastructure be installed to provide protective relay circuit and a supervisory control and data acquisition (SCADA) circuit, together with data and telephone services. The telecommunication path from Ivanpah Substation to the local carrier facility interface at Mountain Pass area consists of approximately eight miles of fiber optic cable to be installed overhead on existing poles and through new underground conduits to be constructed in the substation and telecom carrier interface point. This fiber optic route consists of two segments. The first segment is from Ivanpah Substation to Mountain Pass Substation using the existing Nipton 33-kV distribution line poles built along the transmission line corridor that crosses between Ivanpah 1 and 2. The second segment is from Mountain Pass Substation to the telecommunications facility approximately 1.5 miles away at an interface point to be designated by the local telecommunication carrier. The fiber cable would be installed on the existing 12-kV distribution line poles.

Project Design and Management Approach

Stormwater Management Approach

The proposed project site is located on an alluvial fan that acts as an active stormwater conveyance between the Clark Mountain Range to the west and the Ivanpah Dry Lake to the east. In addition to receiving direct precipitation that results in stormwater runoff, rainfall within the mountains to the west passes through the proposed project site along a complex series of braided channels that are normally dry throughout the year. In response to the original AFC, Energy Commission and BLM provided a series of Data Requests (Numbers 53 through 60, and Number 139) which requested a variety of information and calculations describing the proposed site grading and stormwater management systems, with the intention of understanding both the potential impact of

the proposed development on downstream stormwater flow and sedimentation rates, and the potential impact of stormwater on the facilities (heliostats, fences, roads, buildings, and power blocks) installed as part of the proposed project.

In response to the referenced Data Requests, the Applicant developed an iterative series of conceptual design plans, calculations, and other supporting materials which have resulted in the currently proposed stormwater design and management system. This proposed system, defined in Data Response Set 2I (CH2M Hill 2009a), generally relies on a Low-Impact Development (LID) design concept which attempts to minimize disruption to natural stormwater flow pathways. The elements of the applicant's design approach include:

- Minimizing the areas of direct vegetation removal. Where possible, natural vegetation would be left in place and undisturbed during construction activities. This is to be accomplished through the use of equipment selected to maximize slope-climbing capability, minimize width of footprint, minimize weight of equipment and ground pressure, and allow extended reach across multiple heliostat rows. Vegetation would be actively removed only in the power block areas, long term access roads, and areas where topography modification is required for access or construction. In other areas, vegetation may be cut to facilitate access for construction, but existing root systems would remain in place. Additional cutting of vegetation during active operations would be conducted to avoid interference with mirror movement.
- Minimizing the areas of grading and leveling. Grading would be conducted in areas where existing topography must be modified for installation and operations. This primarily includes the northern portion of Ivanpah 3, and may also include limited areas within Ivanpah 1 and 2.
- Providing for active stormwater management in limited areas. Active stormwater management generally includes construction of erosion protection features, diversion channels, detention ponds, and culverts for road crossings. For the proposed project, these systems would be limited to diversion channels around the power block areas, and installation of erosion protection and/or culverts at channel crossings along the long term access roads (CH2M Hill 2009a). Please see **Figure 3.11** and **Figure 3.12**.

Project Construction

The applicant anticipates ISEGS construction would be performed in the following order: 1) the Construction Logistics Area; 2) Ivanpah 1 (the southernmost site) and other shared facilities; 3) Ivanpah 2 (the middle site); and 4) Ivanpah 3 (the 200-MW plant on the north). However, it is possible that the order of construction may change. The shared facilities will be constructed in connection with the first plant construction, whether it is Ivanpah 1, 2, or 3. Prior to construction, geotechnical testing, heliostat installation tests, and heliostat load tests would be performed in each of the three units. This testing was performed in Ivanpah 1 in the summer of 2009, under a Temporary Use Permit granted by BLM. Should the right-of-way be approved, the additional testing in Ivanpah 2 and 3 would occur within the approved right-of-way area under the conditions associated with the right-of-way grant.

Construction is planned to take place over approximately 48 months, with the applicant's desire that it could begin during the first quarter of 2010 and be completed during the fourth quarter 2013. The applicant has estimated the overall durations and aerial extent of grading at the 3 sites and common construction logistics area as follows:

1. Ivanpah 1 and Common Construction Logistics Area - Total of 4 - 5 months for everything comprising the common construction logistics area (laydown, administration and other buildings, main access roads, road to access gas line, and the substation) and Ivanpah 1 comprising the diagonal access roads, perimeter road for fence, channel crossings as needed, and the power block;
2. Ivanpah 2 - Total of 3 - 4 months comprising the diagonal access roads, perimeter road for fence, channel crossings as needed, power block, and grading of approximately 170 acres in the southwest region of the power plant area;.and
3. Ivanpah 3 - Total of 5 months comprising the diagonal access roads, perimeter road for fence, channel crossings as needed, five solar power tower area and one power block, and grading of approximately 360 acres in the northern and western regions of the power plant area.

Project construction would be performed in accordance with plans and mitigation measures that would assure the project conforms with applicable laws and regulations and would avoid adverse impacts. These plans that are to be developed by the applicant, for which some have already been prepared in draft and reviewed by the BLM to support this environmental analysis, and the necessary mitigation measures, are specified in the Mitigation Measures as appropriate of each technical area of this EIS. Of the plans already prepared in draft by the applicant, those that have contributed most significantly to define the proposed plan of development including construction procedures are as follows:

- Draft Contractor Health and Safety Standards (CH2M Hill 2009c)
- Administrative Draft ISEGS Construction Stormwater Pollution Prevention Plan (CH2M Hill 2009d)
- Preliminary Draft Plan, Revision 2, Drainage, Erosion, and Sediment Control Plan (CH2M Hill 2009e)
- Draft Raven Management Plan, ISEGS (CH2M Hill 2008a)
- Draft Desert Tortoise Translocation/Relocation Plan for ISEGS (CH2M Hill 2009i)
- Application for Incidental Take Permit Under Section 2081 of the Fish and Game Code (CH2M Hill 2009g)
- Draft Biological Assessment for the ISEGS Project (CH2M Hill 2008b)
- Streambed Alteration Agreement Application (CH2M Hill 2009h)
- Weed Management Plan for ISEGS, Eastern Mojave Desert (CH2M Hill 2008c)

Facility Operation and Maintenance

Assuming the construction of Ivanpah 1, 2 and 3 were to begin in a sequential fashion during the first quarter of 2010 and be completed during the fourth quarter of 2013, the applicant would expect to commence commercial operation in the fourth quarter for

each of the power plants beginning in 2011 at Ivanpah 1, in 2012 at Ivanpah 2, and in 2013 at Ivanpah 3. The proposed project would be designed for an operational life of 50 years. During this period, project operations would be supported by a variety of operational, maintenance, and monitoring activities. Within the power blocks, operations would include transmission of water and natural gas into the power block, and operation of the natural gas-fired start-up boiler, the air emission control system for the combustion of natural gas in the start-up boiler, a steam turbine generator, an air-cooled condenser, and auxiliary equipment (feed water heaters, a de-aerator, and an emergency diesel generator, diesel fire pump).

Within the heliostat fields, operations would include routine washing of mirrors on a rotating basis, every two weeks. Washing would utilize water accessed from the groundwater supply wells, following treatment in the water treatment system. Water requirements would include approximately 2.5 gallons every 2 weeks, for a total consumption of 42.7 acre-feet per year. Washing would be done using a truck-mounted pressure washer. Maintenance would also include clipping of vegetation that could interfere with mirror movement to a height of 12 – 18 inches, management of weeds as specified in the Applicant's Weed Management Plan (CH2M Hill 2008c), and use of soil binder and weighting agents to minimize dust accumulation on the mirrors and fugitive dust as could occur by wind or vehicle traffic.

In addition to those activities, discussed above, that would occur within the fenced area, certain routine inspection and maintenance activities would be conducted outside the project security fence. Activities to be conducted outside of the security fence may include inspection and maintenance of the buried natural gas pipeline, the buried water pipelines, and the fence itself, including its desert tortoise exclusion features.

Similar to project construction, facility operations would be performed in accordance with plans and mitigation measures that would assure the project conforms with applicable laws and regulation and would avoid adverse impacts. These plans that are to be developed by the applicant, for which some have already been prepared in draft and reviewed by the BLM to support this environmental analysis, and the necessary mitigation measures, are specified in the Mitigation Measures as appropriate of each technical area of this EIS. Of the plans already prepared in draft by the applicant, those that have contributed most significantly to define the proposed plan of development including operating procedures are as follows:

- Draft Contractor Health and Safety Standards (CH2M Hill 2009c)
- Preliminary Draft Plan, Revision 2, Drainage, Erosion, and Sediment Control Plan (CH2M Hill 2009e)
- Draft Raven Management Plan, ISEGS (CH2M Hill 2008a)
- Application for Incidental Take Permit Under Section 2081 of the Fish and Game Code (CH2M Hill 2009g)
- Draft Biological Assessment for ISEGS (Ivanpah SEGS) Project (CH2M Hill 2008b)
- Weed Management Plan for ISEGS, Eastern Mojave Desert (CH2M Hill 2008c)

Waste Management

Non-hazardous solid wastes generated during construction would include approximately 280 tons of scrap wood, concrete, steel/metal, paper, glass, scrap metals and plastic waste (CH2M Hill 2007, § 5.14.4.1.1). All non-hazardous wastes would be recycled to the extent possible and non-recyclable wastes would be collected by a licensed hauler and disposed in a Class III solid waste disposal facility. Generation of hazardous wastes anticipated during construction includes over 100 5-gallon empty hazardous material containers which would include 4,300 pounds of solvents, waste paint, and adhesives; 3,000 pounds of oil absorbents, used oil, oily rags; and varying amounts of batteries, and waste oil filters. Hazardous wastes would be recycled to the extent possible and disposed in either a Class I or II waste facility as appropriate.

All operational wastes produced at ISEGS would be properly collected, treated (if necessary), and disposed of at either a Class I or II waste facility as appropriate. Wastes include process and sanitary wastewater, nonhazardous waste and hazardous waste, both liquid and solid. A septic system for sanitary wastewater would be located at the administration building/operations and maintenance area, located between Ivanpah 1 and 2. Portable toilets would be placed in the power block areas of each the three solar facilities and pumped by a sanitary service provider. Process wastewater from all equipment, including the boilers and water treatment equipment would be recycled. If necessary, a small filter/purification system would be used to treat project groundwater and provide potable water at the administration building. Any reject streams from water treatment would be trucked off site for treatment or disposal at either a Class I or II waste facility as appropriate. Additionally, two concrete-lined holding basins, approximately 40 feet by 60 feet by 6 feet deep in size, would be part of each power block facility, and would serve for boiler commissioning and emergency outfalls from any of the processes.

Hazardous Waste Management

Hazardous materials used during facility construction and operations would include paints, epoxies, grease, transformer oil, and caustic electrolytes (battery fluid). Several methods would be used to properly manage and dispose of hazardous materials and wastes. Waste lubricating oil would be recovered and recycled by a waste oil recycling contractor. Chemicals would be stored in appropriate chemical storage facilities. Bulk chemicals would be stored in large storage tanks, while most other chemicals would be stored in smaller returnable delivery containers. All chemical storage areas would be designed to contain leaks and spills in concrete containment areas.

Project Decommissioning

Following the operational life of 50 years, the project owner would perform site closure activities to meet federal and state requirements for the rehabilitation and revegetation of the project site after decommissioning. The procedures to be used for project decommissioning and restoration are defined in the Applicant's Draft Closure, Revegetation, and Rehabilitation Plan (CH2M Hill 2009b). Under this plan, all aboveground structures and facilities would be removed to a depth of three feet below grade, and removed offsite for recycling or disposal. Concrete, piping, and other materials existing below three feet in depth would be left in place. Areas that had been graded would be restored to original contours. Succulent plant species would be

salvaged prior to construction, transplanted into windrows, and maintained for later transplanting following decommissioning. Shrubs and other plant species would be revegetated by the collection of seeds, and re-seeding following decommissioning.

Similar to project construction and facility operations, decommissioning would be performed in accordance with plans and mitigation measures that would assure the project conforms with applicable laws and regulations and would avoid adverse impacts. These plans that are to be developed by the applicant, for which some have already been prepared in draft and reviewed by BLM to support this environmental analysis, and the necessary mitigation measures, are specified in the Mitigation Measures as appropriate for each technical area of this EIS. Of the plans already prepared in draft by the applicant, those that have contributed most significantly to define the proposed plan of development including decommissioning procedures are as follows:

- Closure, Revegetation, and Rehabilitation Plan - Revision 3 (CH2M Hill 2010)
- Draft Contractor Health and Safety Standards (CH2M Hill 2009c)
- Preliminary Draft Plan, Revision 2, Drainage, Erosion, and Sediment Control Plan (CH2M Hill 2009e)
- Draft Raven Management Plan, ISEGS (CH2M Hill 2008a)
- Application for Incidental Take Permit Under Section 2081 of the Fish and Game Code (CH2M Hill 2009g)
- Draft Biological Assessment for the ISEGS (Ivanpah SEGS) Project (CH2M Hill 2008b)
- Weed Management Plan for ISEGS, Eastern Mojave Desert (CH2M Hill 2008c).

3.2.2 Mitigated Ivanpah 3 Alternative

Location

The location of the Mitigated Ivanpah 3 Alternative would be the same as that for the proposed project. The Mitigated Ivanpah 3 Alternative would be located in the Mojave Desert, near the Nevada border in San Bernardino County, California, on land administered by the BLM. The Mitigated Ivanpah 3 Alternative site is located 4.5 miles southwest of Primm, Nevada, and 0.5 mile west of the Primm Valley Golf Club, which is located just west of the Ivanpah Dry Lake.

Project and Acreage Description

The configuration of the Mitigated Ivanpah 3 Alternative is shown in **Figure 3.13**. Similar to the proposed project, the Mitigated Ivanpah 3 Alternative would be a development of three solar concentrating thermal power plants, which are comprised of fields of heliostats (elevated mirrors guided by a tracking system) focusing solar energy on boilers located on centralized power towers. Each heliostat tracks the sun throughout the day and reflects the solar energy to the receiver boiler. In each plant, one Rankine-cycle reheat steam turbine receives live steam from the solar boilers and reheat steam from the solar reheater. The applicant would develop the Mitigated Ivanpah 3 Alternative as three power plants in separate and sequential phases that are designed

to generate a total of 370 MW of electricity. Ivanpah 1 would have an electrical generation capacity of 120 MW, and Ivanpah 2 and 3 would have a capacity of 125 MW each. Shared facilities consisting of the substation, administration and maintenance buildings would be developed during construction of the first power plant in the Construction Logistics Area (CLA) between Ivanpah 1 and 2.

The project revision to propose the Mitigated Ivanpah 3 Alternative would reduce the acreage associated with Ivanpah Unit 3 by moving the northern boundary of the ROW grant approximately 1900 feet south of its location in the proposed project, resulting in a reduction of 433 acres of disturbance in that area, as well as a reduction of 433 acres in the total overall ROW grant. The 433-acre area that would be eliminated from the proposed project alternative would be designated as the Northern Rare Plant Mitigation Area (BSE 2010a). The alternative would also eliminate the need to grade approximately 109 acres within the 377-acre CLA area. This area would remain within the ROW grant for the Mitigated Ivanpah 3 Alternative, and 67.5 acres of this area would be used as a Rare Plant Transplantation and Succulent Nursery Area. The alignment of the natural gas pipeline ROW, which would follow the northern boundary of Ivanpah Unit 3 in the proposed project alternative, would be extended to and along the revised northern boundary in the Mitigated Ivanpah 3 Alternative. The remainder of the acreage for the requested ROW grant would remain the same as that for the proposed project. However, other facilities and infrastructure within that footprint, including the boundary between Ivanpah 2 and 3, would be adjusted as needed to allow for construction and operation of the revised project design. The total acreage requested for the ROW for the Mitigated Ivanpah 3 Alternative would be 3564.2 acres.

The acreages of the ROW for the proposed project and the Mitigated Ivanpah 3 Alternative are summarized as follows in **Table 3-5**.

Table 3-5
Mitigated Ivanpah 3 Alternative, Acreage of BLM Right-of-Way

Overview of ISEGS Project Land Use		
Facility	**Proposed Project (acres)**	**Mitigated Ivanpah 3 Alternative (acres)**
Ivanpah Unit 1	913.5	913.5
Ivanpah Unit 2	920.7	1,097
Ivanpah Unit 3	1836.3	1,227
Construction Logistics Area (excludes all areas of Southern California Edison [SCE] exclusive usage)	377.5	159.2
External Features to ISEGS Project Boundaries (widening of Colosseum Road and natural gas line)	24.5	11.1
SCE use for El Dorado-Ivanpah Transmission Line (EITL) (substation, diversion channel, and transmission line)	n/a	90.4
Succulent Nursery and Rare Plant Transplantation Areas	n/a	66
Total ISEGS Project Land Use (including SCE transmission line usage)	4,073	3,564.2

Source: CH2M Hill 2009j; BSE 2010a

Overall, the Mitigated Ivanpah 3 Alternative would require a BLM ROW grant totaling 3564.2 acres (approximately 5.6 square miles), a reduction of 12.5 percent from the

ROW acreage required for the proposed project. Some of the areas included within this ROW grant, particularly the heliostat fields and power blocks within Ivanpah Units 1, 2 and 3, and the permanent facilities located within the CLA, would be permanently disturbed and occupied by ISEGS-related infrastructure throughout the duration of the ROW grant. This would include, at a minimum, the power blocks and heliostat fields associated with Ivanpah Units 1, 2, and 3, and the substation and administrative complex within the CLA. Together, these areas of permanent disturbance would total a minimum of 3290.8 acres, or 92.4 percent of the ROW grant.

Other areas, including the temporary construction staging areas within the CLA, would be disturbed during construction, but would no longer be needed once construction was complete. These areas could potentially have fencing removed, be restored according to the facility's approved Closure, Revegetation, and Rehabilitation Plan, and be removed from the ROW grant once the project becomes operational. These areas comprise a total of approximately 200 acres, or 5.7 percent of the Mitigated Ivanpah 3 Alternative ROW grant.

A third category of land included within the ROW grant includes areas for which the long-term status is uncertain. In their submittal describing the Mitigated Ivanpah 3 proposal (BSE 2010a), the applicant includes 109 acres of the CLA as being removed from development. This 109-acre area includes 59 acres for the Succulent Nursery Area, 7 acres for the Rare Plant Transplantation Area, and two separate areas (38 acres and 5 acres) designated as "mitigation" areas. Although the Mitigated Ivanpah 3 proposal suggests that these areas would not be disturbed, and should therefore be considered part of the reduction of the footprint of the Mitigated Ivanpah 3 Alternative, they are still part of the requested ROW grant, and would presumably be included within the fenced area. Also, the exact nature of activities that would occur within these areas is not defined. Although not used for construction, it seems likely that some level of vehicle traffic and/or ground disturbance would be required in the Succulent Nursery and Rare Plant areas to accommodate the movement and maintenance of plants. Therefore, for the purposes of this SDEIS analysis, BLM assumes that the 109 acre area is included as a disturbed area within the project footprint.

As the applicant finalizes their detailed plans, they may be able to avoid or minimize disturbance to certain areas, allowing these areas to remain as viable desert tortoise habitat. Therefore, a provision has been added to a mitigation measure, designated as BIO-17 in the DEIS, such that the acreage requiring mitigation for Desert Tortoise can be updated at a later time subject to BLM and Energy Commission approval. Through this process, the temporary disturbance areas and the areas with an unknown long-term status can be removed from the total land area requiring biological mitigation for compensation purposes.

Solar Power Plant Equipment and Facilities

Heliostats

The physical characteristics (size, materials, etc.) of the heliostats in the Mitigated Ivanpah 3 Alternative would be the same as those described in the DEIS for the proposed project. The primary difference would be that the Mitigated Ivanpah 3 Alternative would require approximately 40,000 fewer heliostats than the proposed

project, or a total of 173,500. The reduction would be reached by not installing heliostats in the 433 acre northern portion of Ivanpah Unit 3.

The physical arrangement of the heliostats within the project boundaries would also be adjusted from that proposed project. In the proposed project, the heliostats in Ivanpah Unit 3 were arranged concentrically around five individual power towers. In the Mitigated Ivanpah 3 Alternative, the heliostats in Ivanpah Unit 3 would be arranged around a single power tower, thus requiring modification of their arrangement and configuration within the unit.

The Mitigated Ivanpah 3 Alternative would also include modification of the location of the boundary between Ivanpah Units 2 and 3 from that in the proposed project. This is due to the overall higher effectiveness of heliostats in the northern portion of a heliostat field (reflecting the sun in the southern sky) versus those in the southern portion. By eliminating the northern 433 acre portion of Ivanpah Unit 3 without adjusting the boundaries, the impact on the power output of Ivanpah Unit 3 in the Mitigated Ivanpah 3 Alternative would be much greater than the proportion of heliostats eliminated, because it would be the more effective northern heliostats eliminated. Therefore, the revised project design would re-direct a large number of “southern-field” heliostats in Ivanpah Unit 3 to become “northern-field” heliostats directed at the power tower in Ivanpah Unit 2. Combined with a proposed modification to the steam turbines in the Ivanpah Unit 2 and 3 power blocks (discussed below), these revisions result in reduced output from Ivanpah Unit 3 from 200 MW to 125 MW. However, they also result in increased output from Ivanpah Unit 2 from 100 to 125 MW (BSE 2010a).

Power Towers

The overall size, construction, and operation of the power towers in the Mitigated Ivanpah 3 Alternative would be the same as that described in the DEIS for the proposed project. The location and physical characteristics of the power towers in Ivanpah Units 1 and 2 would be the same as that for the proposed project. However, the number and location of power towers in Ivanpah Unit 3 would be modified from that in the proposed project. The proposed project includes five separate power towers within Ivanpah Unit 3. In the Mitigated Ivanpah 3 Alternative, the number of power towers would be reduced to one. The single power tower would be located in the center of the revised Ivanpah Unit 3 acreage, and thus located approximately 272 feet southwest of the location of the power block in the proposed project (BSE 2010a).

Power Block

The size, construction, location, and operation of the power blocks in the Mitigated Ivanpah 3 Alternative would be the same as that described in the DEIS for the proposed project. The location and physical characteristics of the power block in Ivanpah Unit 1 would be the same as that for the proposed project. However, the size of the steam turbines installed in the power blocks in Ivanpah Units 2 and 3 may be adjusted to make up for the reduction in power output caused by the elimination of heliostats (BSE 2010a). The power block in Ivanpah Unit 3 would be located approximately 272 feet southwest of its location in the proposed project.

Related Equipment and Facilities

Natural Gas Pipeline

The Mitigated Ivanpah 3 Alternative would require the use of natural gas in the same manner as that described in the DEIS for the proposed project. The source of the natural gas, the Kern River Gas Transmission Line located to the north of the proposed ISEGS facility, would be the same for the proposed project and the Mitigated Ivanpah 3 Alternative (BSE 2010a). The primary difference would be the length of the pipeline corridor that would exist outside of the project boundaries between the Kern River line and the modified northern border of Ivanpah Unit 3. In the proposed project, the length of this pipeline corridor was estimated to be 2,011 feet. Because the northern boundary of Ivanpah Unit 3 would be moved approximately 1,900 feet to the south, the length of the corridor would be approximately 3,911 feet in the Mitigated Ivanpah 3 Alternative.

The route of the pipeline would also be adjusted. In the proposed project, the pipeline corridor extends directly south from the Kern River line to its intersection with the northern border of Ivanpah Unit 3. At that location, the pipeline corridor would follow the northern border of Ivanpah Unit 3 to the east until it intersects the eastern boundary of Ivanpah Unit 3. The pipeline corridor would then follow the eastern boundary of Ivanpah Unit 3 to the south, ultimately being directed into the power blocks for Units 3, 2, and 1, respectively. In the Mitigated Ivanpah 3 Alternative, the pipeline corridor would still extend east along the northern border of Ivanpah Unit 3, but that eastward extension would be located approximately 1,900 feet south of its location in the proposed project. Once it reaches the eastern boundary of Ivanpah Unit 3, the pipeline corridor for the Mitigated Ivanpah 3 Alternative would then re-join, and be the same as that for the proposed project.

Air Pollution Control

The air pollution control equipment and management practices used on the natural gas-fired start-up boilers for the Mitigated Ivanpah 3 Alternative would be the same as those used for the proposed project. The size of the boiler used for Ivanpah Unit 3 in the alternative would be approximately 50 percent of the size of the boiler in the proposed project (BSE 2010a). However, the associated low-NOx burners, good combustion practices, continuous monitoring for NOx and CO, and operational limitations would be no different than those associated with the proposed project.

Water Supply and Discharge

The general need for a water supply and discharge would be the same for the Mitigated Ivanpah 3 Alternative as for the proposed project. Both the proposed project and Mitigated Ivanpah 3 Alternative would require water as make-up water for the steam system, washwater for the heliostats, and potable water for domestic water needs (BSE 2010a). The volume of water required to support the Mitigated Ivanpah 3 Alternative would be slightly reduced from that required for the proposed project. This reduction would be due to the reduced number of heliostats that require washing in the Mitigated Ivanpah 3 Alternative. Because the reduction in the number of heliostats is approximately 18.7 percent, and heliostat washing is the largest use of water during operations, it is estimated that the volume of water required for operations would be reduced by about 18.7 percent.

The source of water for both alternatives would be groundwater supplied from one of two wells installed in the alluvial fan aquifer, and located within the CLA. To accommodate changes in the use of different areas of the CLA, the location of the wells within the CLA would be different in the Mitigated Ivanpah 3 Alternative. In the proposed project, the wells would be located in the southeast corner of the CLA, on the southeast side of the existing transmission lines, and abutting Ivanpah Unit 1. In the Mitigated Ivanpah 3 Alternative, the wells would be located in the northern portion of the CLA, north of the transmission lines, and close to Ivanpah Unit 2 (BSE 2010a). The wells would be located approximately 2400 feet north of the location in the proposed project.

Similar to the proposed project, the groundwater would be treated in activated carbon filters, de-ionization media, and a mixed-bed polisher to provide water of the required quality, and then directed to storage tanks designated for plant process needs and fire protection. The water in both alternatives would be supplied to the power blocks through underground pipelines (BSE 2010a). Because the locations of the wells would be modified, the precise route of the water pipelines within the CLA would be different in the Mitigated Ivanpah 3 Alternative than the proposed project. However, the routes for both alternatives would be located entirely within the broader outlines of the ROW grant, and the portions of the pipeline routes outside of the CLA would be the same for both alternatives.

Fire Protection

The fire protection system included as part of the Mitigated Ivanpah 3 Alternative would be exactly the same as that for the proposed project (BSE 2010a). For both alternatives, fire protection is provided through a 250,000 gallon water tank located at each power block, with 150,000 gallons reserved for fire protection purposes.

Access Roads and Maintenance Paths

The general approach for relocating existing roads and off-highway vehicle (OHV) trails would be the same for the Mitigated Ivanpah 3 Alternative and the proposed project (BSE 2010a). Both alternatives would require paving and re-routing a portion of Colosseum Road to provide site access, and to divert the road around Ivanpah Unit 2. The configuration and construction details of the access roads to the power blocks, and the concentric heliostat maintenance paths, would be the same for both alternatives.

A primary difference between the proposed project and the Mitigated Ivanpah 3 Alternative would be the locations of the re-routed portions of two OHV trails. In the proposed project, Trail 699226, which currently passes through the northern portion of Ivanpah Unit 3, would be re-located around the outside of the facility, parallel to the northern boundary of Unit 3. Similarly, Trail 699198, currently passing through the proposed Ivanpah Unit 2 location, would be re-routed to a location between Ivanpah Units 2 and 3. In the Mitigated Ivanpah 3 Alternative, Trail 699226 would still be located within the boundaries of Unit 3. As a result, re-location of the trail along the northern boundary of Ivanpah Unit 3 would still be necessary. However, because the location and configuration of the northern boundary of Ivanpah Unit 3 would be approximately 1,900 feet further south in the Mitigated Ivanpah 3 Alternative, the re-routed location would be accordingly revised. Overall, the Mitigated Ivanpah 3 Alternative would result in a shorter, less obtrusive re-routing of this trail than would be associated with the

proposed project. Because the location of the Ivanpah Unit 2 and 3 boundary would also be different in the Mitigated Ivanpah 3 Alternative, the location of the re-routed Trail 699198 would also be adjusted accordingly. In this case, the re-routed distance would be approximately the same in both alternatives, but in a slightly different location.

Construction Logistics Area, Substation, and Administrative Complex

Because it involves four fewer power tower receivers and 40,000 fewer heliostats, the Mitigated Ivanpah 3 Alternative would require a smaller amount of acreage (109 fewer acres) within the CLA for construction purposes. However, the alternative would use most of this acreage for a Rare Plant Transplantation Area (approximately 7 acres) and a Succulent Nursery Area (59 acres). Overall, both alternatives would require the same 377 acres designated in the ROW grant for the CLA (BSE 2010a).

In the proposed project, almost all of the CLA acreage would undergo either permanent or temporary disturbance associated with the substation, administrative complex, monitoring wells, and temporary construction laydown and storage areas. In the Mitigated Ivanpah 3 Alternative, the acreage of permanent disturbance required for the permanent facilities would be the same as that for the proposed project. However, the locations of these facilities and associated disturbance would be adjusted within the 377 acre boundaries of the CLA. The location of the substation would be the same for both alternatives, but the administrative complex and monitoring well locations would be re-located from the southeastern portion of the CLA in the proposed project to the northern portion of the CLA in the Mitigated Ivanpah 3 Alternative (BSE 2010a).

Fencing

The type, construction, and maintenance of fencing used for facility security and tortoise barrier would be the same for the proposed project and Mitigated Ivanpah 3 Alternatives (BSE 2010a). The fencing would be comprised of 8-foot tall steel chain-link topped with barbed wire for security purposes, and would also incorporate 1-inch horizontal by 2-inch vertical galvanized, welded wire fence as a tortoise barrier. Because the locations of the outside perimeter of Ivanpah Unit 3 and the boundary between Units 2 and 3 would be modified, the locations of the associated fencing would also be modified in the Mitigated Ivanpah 3 Alternative. The fence location at the northern boundary of Ivanpah Unit 3 would be approximately 1,900 feet south of its location in the proposed project, and the location of the boundary fence between Units 2 and 3 would be slightly north of its location in the proposed project.

As described in the DEIS for the proposed project, the applicant would need to have the fence located inset from the ROW boundary in order to allow for access to the fence from the outside for inspection and maintenance purposes. Also, with respect to the proposed project, the applicant stated a potential need to construct stormwater drainage systems outside of the fence, if needed to address stormwater damage issues. These requirements would still apply to the areas outside of the fence in the Mitigated Ivanpah 3 Alternative. If these inspection or maintenance activities would be required in areas outside of the approved ROW grant, then supplemental environmental review and analysis would need to be implemented, and appropriate land use authorizations and permits would need to be acquired by the applicant.

Transmission System Interconnection and Upgrades

The transmission system requirements of the Mitigated Ivanpah 3 Alternative would be exactly the same as that described for the proposed project (BSE 2010a). Although the total output of the facility would be reduced from 400 MW to 370 MW, the locations and capacities of the required gen-tie lines, Ivanpah substation, and switchyards with step-up transformers would all be the same as those required for the proposed project. The reduced output would also not affect the identified need and plan by SCE to upgrade approximately 36 miles of 115 kV transmission line to 230 kV. The EITP project is proposed to accommodate an anticipated 1400 MW of load generation by ISEGS and five other planned renewable energy projects in the area, and the reduction of the ISEGS output from 400 MW to 370 MW would not be expected to affect the overall need for that project. The environmental impact of the EITP project is currently being evaluated by BLM and the CPUC, and is also considered as part of the analysis of cumulative impacts of the ISEGS project in Section 5 of this FEIS.

Telecommunications Facilities

The telecommunications infrastructure required to support the Mitigated Ivanpah 3 Alternative would be exactly the same as that for the proposed project (BSE 2010a). For both alternatives, the infrastructure is necessary to provide protective relay circuit and a SCADA circuit for the proposed Ivanpah Substation, as well as data and telephone services. These services will be obtained by the construction of approximately eight miles of fiber optic cable from the ISEGS facility to Mountain Pass, along existing distribution line poles.

<u>Project Design and Management Approach</u>

Stormwater Management Approach

The general approach to be used to address stormwater management would be the same for the Mitigated Ivanpah 3 Alternative as for the proposed project. This approach includes the following elements:

- Using a Low Impact Development approach to minimize the amount of grading, vegetation removal, soil compaction, and site disturbance during construction of the heliostat fields;
- Providing active stormwater protection, through the use of diversion channels, around only the power blocks and CLA; and
- Allowing stormwater to follow natural flow paths through the heliostat fields.

Field investigations and stormwater modeling performed by the applicant and BLM during the DEIS process indicated that the deepest and widest stormwater drainage channels, and those expected to receive the highest volume and velocity of flow during major storm events, were those located in the northern portion of Ivanpah Unit 3. Accordingly, in the proposed project description, the primary area designated as requiring grading to allow construction of heliostat fields was the northern portion of Ivanpah Unit 3. Also, because the size of these channels is largest in the northern portion of Ivanpah Unit 3, that area comprised the greatest amount of drainage channel acreage that would be affected by the project.

Reduction of these impacts and associated mitigation requirements was one element in the applicant's decision to propose the Mitigated Ivanpah 3 Alternative. The revised northern boundary of Unit 3 in the alternative was designed, in part, to avoid the installation of heliostat fields in the most active drainages in this area. Accordingly, the Mitigated Ivanpah 3 Alternative would require an amount of grading, site disturbance, vegetation removal, and soil compaction that is substantially reduced from that associated with the proposed project (BSE 2010a).

Project Construction

In general, the sequence, procedures, and equipment used for project construction would be the same for the Mitigated Ivanpah 3 Alternative and the proposed project. The primary difference that would be expected between the construction procedures and schedules would be the duration of construction, especially associated with Ivanpah Unit 3. The duration of construction for Ivanpah Unit 2 would likely be longer than the 3 to 4 months for the proposed project, due to the increased number of heliostats. However, the duration of the construction of Ivanpah Unit 3 would be substantially reduced due to the elimination of four power tower receiver units, and elimination of more than 40,000 heliostats (BSE 2010a).

The construction equipment used for both alternatives would be the same; however, the areas and duration needed for the use of grading equipment would be reduced for the Mitigated Ivanpah 3 Alternative.

The standards and procedures to be used during construction would be the same for both alternatives. The construction of the Mitigated Ivanpah 3 Alternative would be subject to BLM Conditions of Approval as defined in the Record of Decision, Energy Commission Conditions of Certification, and permit and regulatory requirements of other state and federal agencies. These conditions would include provisions defined in the applicant's submittals for the proposed project, including:

- Draft Contractor Health and Safety Standards (CH2M Hill 2009c)
- Administrative Draft ISEGS Construction Stormwater Pollution Prevention Plan (CH2M Hill 2009d)
- Preliminary Draft Plan, Revision 2, Drainage, Erosion, and Sediment Control Plan (CH2M Hill 2009e)
- Draft Raven Management Plan, ISEGS (CH2M Hill 2008a)
- Draft Desert Tortoise Translocation/Relocation Plan for ISEGS (CH2M Hill 2009f)
- Application for Incidental Take Permit Under Section 2081 of the Fish and Game Code (CH2M Hill 2009g)
- Draft Biological Assessment for the ISEGS Project (CH2M Hill 2008b)
- Streambed Alteration Agreement Application (CH2M Hill 2009h)
- Weed Management Plan for ISEGS, Eastern Mojave Desert (CH2M Hill 2008c)

Facility Operation and Maintenance

The operation and maintenance of the facility, as developed under the Mitigated Ivanpah 3 Alternative, would be the same as that for the proposed project. The specific

operational procedures to be used in daily operations of Ivanpah Units 2 and 3 would differ, due to the different configurations and outputs of these Units in the Mitigated Ivanpah 3 Alternative. The primary differences would include a reduction in the level of effort and water volume needed for heliostat washing, and a reduction in the amount of natural gas burned in the start-up boilers (BSE 2010a). By reducing the number of heliostats from 214,000 to 173,500 (a reduction of 19 percent), the amount of water used for heliostat washing during operations would also be reduced by approximately 19 percent. The start-up boilers would be reduced in size from 924.4 million British thermal units per hour (MMBtu/hr); two boilers at 231.1 and one boiler at 462.2 MMBtu/hr in the proposed project to 693.3 MMBtu/hr in the Mitigated Ivanpah 3 Alternative, a reduction in natural gas usage of 25 percent.

Like construction, the standards and procedures to be used during operation and maintenance would be subject to BLM Conditions of Approval as defined in the Record of Decision, Energy Commission Conditions of Certification, and permit and regulatory requirements of other state and federal agencies. These conditions would include provisions defined in the applicant's submittals for the proposed project, including:

- Draft Contractor Health and Safety Standards (CH2M Hill 2009c)
- Preliminary Draft Plan, Revision 2, Drainage, Erosion, and Sediment Control Plan (CH2M Hill 2009e)
- Draft Raven Management Plan, ISEGS (CH2M Hill 2008a)
- Application for Incidental Take Permit Under Section 2081 of the Fish and Game Code (CH2M Hill 2009g)
- Draft Biological Assessment for the ISEGS Project (CH2M Hill 2008b)
- Weed Management Plan for ISEGS, Eastern Mojave Desert (CH2M Hill 2008c)

Waste Management

The types of non-hazardous solid wastes generated during construction, operations, and closure of the facility under the Mitigated Ivanpah 3 Alternative would be the same as those generated as part of the proposed project. All materials would be managed, recycled, and/or disposed of in the same manner for each alternative. The primary difference is that the Mitigated Ivanpah 3 Alternative is expected to generate a reduced volume of non-hazardous wastes, as compared to the proposed project. This is due to the reduced size of the Mitigated Ivanpah 3 Alternative, including construction of three power tower receivers instead of seven, and installation of 40,000 fewer heliostats (BSE 2010a).

Hazardous Waste Management

The types of hazardous materials used during project construction and operations under the Mitigated Ivanpah 3 Alternative would be the same as those generated as part of the proposed project. All materials would be managed, recycled, and/or disposed in the same manner for each alternative. Similar to non-hazardous wastes, the Mitigated Ivanpah 3 Alternative is expected to use a reduced volume of hazardous materials, as compared to the proposed project. This is due to the reduced size of the Mitigated

Ivanpah 3 Alternative, including construction of three power tower receivers instead of seven, and installation of 40,000 fewer heliostats (BSE 2010a).

Project Decommissioning

The closure and decommissioning of the facility, as developed under the Mitigated Ivanpah 3 Alternative, would be the same as that for the proposed project. Similar to construction, the duration of the closure would be reduced under the Mitigated Ivanpah 3 Alternative, due to the reduced number of power tower receivers and heliostats that would require removal (BSE 2010a).

Like construction and operations, the standards and procedures to be used during closure and decommissioning would be subject to BLM Conditions of Approval as defined in the Record of Decision, Energy Commission Conditions of Certification, and permit and regulatory requirements of other state and federal agencies. These conditions would include provisions defined in the applicant's submittals for the proposed project, including:

- Closure, Revegetation, and Rehabilitation Plan - Revision 3 (CH2M Hill 2010)
- Draft Contractor Health and Safety Standards (CH2M Hill 2009c)
- Preliminary Draft Plan, Revision 2, Drainage, Erosion, and Sediment Control Plan (CH2M Hill 2009e)
- Draft Raven Management Plan, ISEGS (CH2M Hill 2008a)
- Application for Incidental Take Permit Under Section 2081 of the Fish and Game Code (CH2M Hill 2009g)
- Draft Biological Assessment for the ISEGS Project (CH2M Hill 2008b)
- Weed Management Plan for ISEGS, Eastern Mojave Desert (CH2M Hill 2008c).

3.2.3 Modified I-15 Alternative

<u>**Location**</u>

The general location of the Modified I-15 Alternative would be the same as that for the proposed project. The Modified I-15 Alternative would be located in the Mojave Desert, near the Nevada border in San Bernardino County, California, on land administered by the BLM. The Modified I-15 Alternative site is located 4.5 miles southwest of Primm, Nevada, and 0.5 mile west of the Primm Valley Golf Club, which is located just west of the Ivanpah Dry Lake.

<u>**Project and Acreage Description**</u>

The configuration of the Modified I-15 Alternative is shown in **Figure 3-14** (BSE 2010b). Similar to the proposed project, the Modified I-15 Alternative would be a development of three solar concentrating thermal power plants, which are comprised of fields of heliostats (elevated mirrors guided by a tracking system) focusing solar energy on boilers located on centralized power towers. Each heliostat tracks the sun throughout the day and reflects the solar energy to the receiver boiler. In each plant, one Rankine-cycle reheat steam turbine receives live steam from the solar boilers and reheat steam

from the solar reheater. The applicant would develop the Modified I-15 Alternative as three power plants in separate and sequential phases that are designed to generate a total of 370 MW of electricity. Ivanpah 1 would have an electrical generation capacity of 120 MW, and Ivanpah 2 and 3 would have a capacity of 125 MW each. Shared facilities consisting of the substation, administration and maintenance buildings would be developed during construction of the first power plant in the CLA between Ivanpah 1 and 2.

The Modified I-15 Alternative would reduce the acreage associated with Ivanpah Unit 3, and in the overall ROW grant, by 433 acres. The alternative would also eliminate the need to grade approximately 109 acres within the 377-acre CLA area. This area would remain within the ROW grant for the Modified I-15 Alternative, and 67.5 acres of this area would be used as a Rare Plant Transplantation and Succulent Nursery Area. The alignment of the natural gas pipeline ROW, which would follow the northern boundary of Ivanpah Unit 3 in the proposed project alternative, would be extended to and along the northern boundary of Ivanpah Unit 2 in the Modified I-15 Alternative. The remainder of the acreage for the requested ROW grant would remain the same as that for the proposed project. However, other facilities and infrastructure within that footprint would be adjusted as needed to allow for construction and operation of the revised project design. The total acreage requested for the ROW for the Modified I-15 Alternative would be 3,564.2 acres.

The acreages of the ROW for the proposed project and the Modified I-15 Alternative are summarized as follows in **Table 3-6**.

Table 3-6
Modified I-15 Alternative, Acreage of BLM Right-of-Way

Overview of ISEGS Project Land Use		
Facility	**Proposed Project (acres)**	**Modified I-15 Alternative (acres)**
Ivanpah Unit 1	913.5	913.5
Ivanpah Unit 2	920.7	1,097
Ivanpah Unit 3	1836.3	1,227
Construction Logistics Area (excludes all areas of SCE exclusive usage)	377.5	159.2
External Features to ISEGS Project Boundaries (widening of Colosseum Road and natural gas line)	24.5	11.1
SCE use for EITP (substation, diversion channel, and transmission line)	n/a	90.4
Succulent Nursery and Rare Plant Transplantation Areas	n/a	66
Total ISEGS Project Land Use (including SCE transmission line usage)	4,073	3,564.2

Source: CH2M Hill 2009j; BSE 2010a

Overall, the Modified I-15 Alternative would require a BLM ROW grant totaling 3564.2 acres (approximately 5.6 square miles), a reduction of 12.5 percent from the ROW acreage required for the proposed project. Although no specific proposal for the Modified I-15 Alternative has been submitted by the applicant, for the purpose of this

analysis, it is assumed to be the same as the Mitigated Ivanpah 3 Alternative, with the exception of the reconfiguration of Ivanpah Unit 3. Therefore, the information provided by the applicant for the Mitigated Ivanpah 3 Alternative is assumed to be relevant for the Modified I-15 Alternative. Some of the areas included within this 3,564.2–acre ROW grant, particularly the heliostat fields and power blocks within Ivanpah Units 1, 2 and 3, and the permanent facilities located within the CLA, would be permanently disturbed and occupied by ISEGS-related infrastructure throughout the duration of the ROW grant. This would include, at a minimum, the power blocks and heliostat fields associated with Ivanpah Units 1, 2, and 3, and the substation and administrative complex within the CLA. Together, these areas of permanent disturbance would total a minimum of 3,290.8 acres, or 92.4 percent of the ROW grant.

Other areas, including the temporary construction staging areas within the CLA, would be disturbed during construction, but would no longer be needed once construction was complete. These areas could potentially have fencing removed, be restored according to the facility's approved Closure, Revegetation, and Rehabilitation Plan, and be removed from the ROW grant once the project becomes operational. These areas comprise a total of approximately 200 acres, or 5.7 percent of the Modified I-15 Alternative ROW grant.

A third category of land included within the ROW grant includes areas for which the long-term status is uncertain. In their submittal describing the Mitigated Ivanpah 3 proposal (BSE 2010a), the applicant includes 109 acres of the CLA as being removed from development. This 109-acre area includes 59 acres for the Succulent Nursery Area, 7 acres for the Rare Plant Transplantation Area, and two separate areas (38 acres and 5 acres) designated as "mitigation" areas. Although the Mitigated Ivanpah 3 proposal suggests that these areas would not be disturbed, and should therefore be considered part of the reduction of the footprint of the Mitigated Ivanpah 3 Alternative, they are still part of the requested ROW grant, and would presumably be included within the fenced area. Also, the exact nature of activities that would occur within these areas is not defined. Although not used for construction, it seems likely that some level of vehicle traffic and/or ground disturbance would be required in the Succulent Nursery and Rare Plant areas to accommodate the movement and maintenance of plants. Therefore, for the purposes of this SDEIS analysis of the Modified I-15 Alternative, BLM assumes that the 109-acre area is included as a disturbed area within the project footprint.

As the applicant finalizes their detailed plans, they may be able to avoid or minimize disturbance to certain areas, allowing these areas to remain as viable desert tortoise habitat. Therefore, a provision has been added to a mitigation measure, designated as BIO-17 in the DEIS, such that the acreage requiring mitigation for desert tortoise can be updated at a later time subject to BLM and Energy Commission approval. Through this process, the temporary disturbance areas and the areas with an unknown long-term status can be removed from the total land area requiring biological mitigation for compensation purposes.

Solar Power Plant Equipment and Facilities

Heliostats

The physical characteristics (size, materials, etc.) and number of the heliostats in the Modified I-15 Alternative would be the same as those described in Section 3.4 for the Mitigated Ivanpah 3 Alternative. The primary difference from the proposed project would be that the Modified I-15 Alternative would require approximately 40,000 fewer heliostats than the proposed project, or a total of 173,500.

The physical arrangement of the heliostats within the project boundaries would also be adjusted from that proposed project. In the proposed project, the heliostats in Ivanpah Unit 3 were arranged concentrically around five individual power towers. In the Modified I-15 Alternative, the heliostats in Ivanpah Unit 3 would be arranged around a single power tower, thus requiring modification of their arrangement and configuration within the unit.

The Modified I-15 Alternative would also include reconfiguration of the location of the northern boundary of Ivanpah Unit 2 from that in the proposed project. Combined with a proposed modification to the steam turbines in the Ivanpah Unit 2 and 3 power blocks (discussed below), these revisions result in reduced output from Ivanpah Unit 3 from 200 MW to 125 MW. However, they also result in increased output from Ivanpah Unit 2 from 100 to 125 MW (BSE 2010a).

Power Towers

The overall size, construction, and operation of the power towers in the Modified I-15 Alternative would be the same as that described in Section 3.4 for the Mitigated Ivanpah 3 Alternative, but different from that in the proposed project. The location and physical characteristics of the power towers in Ivanpah Units 1 and 2 would be the same as that for the proposed project. However, the number and location of power towers in Ivanpah Unit 3 would be modified from that in the proposed project. The proposed project includes five separate power towers within Ivanpah Unit 3. In the Modified I-15 Alternative, the number of power towers would be reduced to one. The single power tower would be located in the center of the revised Ivanpah Unit 3 acreage, and thus located approximately four miles to the southeast of the Unit 3 power block in the proposed project.

Power Block

The size, construction, and operation of the Unit 1 and 2 power blocks in the Modified I-15 Alternative would be the same as that described in the DEIS for the proposed project. The location and physical characteristics of the power blocks in Ivanpah Units 1 and 2 would be the same as that for the proposed project. However, the power block in Ivanpah Unit 3 would be located to the south of Ivanpah Unit 1. Also, the size of the steam turbines installed in the power blocks in Ivanpah Units 2 and 3 may be adjusted to make up for the reduction in power output caused by the elimination of heliostats (BSE 2010a).

Related Equipment and Facilities

Natural Gas Pipeline

The Modified I-15 Alternative would require the use of natural gas in the same manner as that described in the DEIS for the proposed project. The source of the natural gas, the Kern River Gas Transmission Line located to the north of the proposed ISEGS facility, would be the same for the proposed project and the Modified I-15 Alternative. The primary difference would be the length of the pipeline corridor that would exist outside of the project boundaries between the Kern River line and the ISEGS facility, and the need to extend the pipeline to the south of Ivanpah Unit 1 in order to service the reconfigured location of Ivanpah Unit 3. In the proposed project, the length of the pipeline corridor to the north of the ISEGS facility was estimated to be 2,011 feet. However, Ivanpah 3 would not be constructed in the same location, so the pipeline would need to extend to the northern boundary of Ivanpah Unit 2 instead of Unit 3. Because the original Ivanpah Unit 3 area would be removed from the development, the length of the corridor outside of the facility boundaries would be a minimum of 10,560 feet in the Modified I-15 Alternative, or more than five times the length of the corridor for the proposed project.

In addition to the extended length of the corridor between the Kern River line and the ISEGS facility, the pipeline would also need to extend to the south of Ivanpah Unit 1. In the proposed project, the line entered Ivanpah Unit 1 at its northwestern boundary. To extend to the reconfigured location of Ivanpah Unit 3, the line would need to extend an additional 6,200 feet (approximately) south along the western boundary of Ivanpah Unit 1, and then an additional 5,000 feet (approximately) into the probable power block area of Unit 3. Therefore, the Modified I-15 Alternative would require an estimated increase of more than 11,000 feet to the length of the pipeline ROW.

Air Pollution Control

The air pollution control equipment and management practices used on the natural gas-fired start-up boilers for the Modified I-15 Alternative would be exactly the same as those used for the proposed project. The size of the boiler used for Ivanpah Unit 3 in the alternative would be approximately 50 percent of the size of the boiler in the proposed project (BSE 2010a). However, the associated low-NOx burners, good combustion practices, continuous monitoring for NOx and CO, and operational limitations would be no different than those associated with the proposed project.

Water Supply and Discharge

The use of water and source of water for the Modified I-15 Alternative would be exactly the same as that described in the DEIS for the proposed project.

The general need for a water supply and discharge would be the same for the Modified I-15 Alternative as for the proposed project. Both the proposed project and Modified I-15 Alternative would require water as make-up water for the steam system, washwater for the heliostats, and potable water for domestic water needs (BSE 2010a). The volume of water required to support the Modified I-15 Alternative would be slightly reduced from that required for the proposed project. This reduction would be due to the reduced number of heliostats that require washing in the Modified I-15 Alternative.

Because the reduction in the number of heliostats is approximately 18.7 percent, and heliostat washing is the largest use of water during operations, it is estimated that the volume of water required for operations would be reduced by about 18.7 percent.

The source of water for both alternatives would be groundwater supplied from one of two wells located within the CLA. To accommodate changes in the use of different areas of the CLA, the location of the wells within the CLA would be different in the Modified I-15 Alternative than the proposed project. In the proposed project, the wells would be located in the southeast corner of the CLA, on the southeast side of the existing transmission lines, and abutting Ivanpah Unit 1. In the Modified I-15 Alternative, the wells would be located in the northern portion of the CLA, north of the transmission lines, and close to Ivanpah Unit 2 (BSE 2010a). The wells would be located approximately 2,400 feet north of the location in the proposed project.

Similar to the proposed project, the groundwater would be treated in activated carbon filters, de-ionization media, and a mixed-bed polisher to provide water of the required quality, and then directed to storage tanks designated for plant process needs and fire protection. The water in both alternatives would be supplied to the power blocks through underground pipelines (BSE 2010a). Because the locations of the wells would be modified, the precise route of the water pipelines within the CLA would be different in the Modified I-15 Alternative than the proposed project. However, the routes for both alternatives would be located entirely within the broader outlines of the ROW grant, and the portions of the pipeline routes outside of the CLA would be the same for both alternatives.

Fire Protection

The fire protection system included as part of the Modified I-15 Alternative would be exactly the same as that for the proposed project. For both alternatives, fire protection is provided through a 250,000 gallon water tank located at each power block, with 150,000 gallons reserved for fire protection purposes.

Access Roads and Maintenance Paths

The general approach for relocating existing roads and OHV trails would be the same for the Modified I-15 Alternative and the proposed project. Both alternatives would require paving and re-routing a portion of Colosseum Road to provide site access, and to divert the road around Ivanpah Unit 2. The configuration and construction details of the access roads to the power blocks, and the concentric heliostat maintenance paths, would be the same for both alternatives.

A primary difference between the proposed project and the Modified I-15 Alternative would be that different OHV trails would be affected, and would require re-routing. In the proposed project, Trail 699226, which currently passes through the northern portion of Ivanpah Unit 3, would be re-located around the outside of the facility, parallel to the northern boundary of Unit 3. In the Modified I-15 Alternative, the 8,100 feet of Trail 699226 would not be affected, and would not require re-alignment. However, the new location of Ivanpah Unit 3 in the Modified I-15 Alternative would affect three other trails, as follows; Trail 699238 (for 2,880 feet), Trail 699194 (for 8,880 feet), and Trail 699221 (for 960 feet). The length of these trails within the Modified I-15 Alternative footprint is estimated at a total of 12,720 feet. Overall, the Modified I-15 Alternative would result in

a longer and more obtrusive re-routing of existing trails than would be associated with the proposed project.

Construction Logistics Area, Substation, and Administrative Complex

Because it involves four fewer power tower receivers and 40,000 fewer heliostats, the Modified I-15 Alternative would require a smaller amount of acreage (109 fewer acres) within the CLA for construction purposes. However, the alternative would use most of this acreage for a Rare Plant Transplantation Area (approximately 7 acres) and a Succulent Nursery Area (59 acres). Overall, both alternatives would require the same 377 acres designated in the ROW grant for the CLA (BSE 2010a).

In the proposed project, almost all of the CLA acreage would undergo either permanent or temporary disturbance associated with the substation, administrative complex, monitoring wells, and temporary construction laydown and storage areas. In the Modified I-15 Alternative, the acreage of permanent disturbance required for the permanent facilities would be the same as that for the proposed project. However, the locations of these facilities and associated disturbance would be adjusted within the 377-acre boundaries of the CLA. The location of the substation would be the same for both alternatives, but the administrative complex and monitoring well locations would be re-located from the southeastern portion of the CLA in the proposed project to the northern portion of the CLA in the Modified I-15 Alternative (BSE 2010a).

Fencing

The type, construction, and maintenance of fencing used for facility security and tortoise barrier would be the same for the proposed project and Modified I-15 Alternative. The only difference would be the location of the fence, which would surround the Ivanpah Unit 3 in a different location under the Modified I-15 Alternative. As described in the DEIS for the proposed project, the applicant would need to have the fence located inset from the ROW boundary in order to allow for access to the fence from the outside for inspection and maintenance purposes. Also, with respect to the proposed project, the applicant stated a potential need to construct stormwater drainage systems outside of the fence, if needed to address stormwater damage issues. These requirements would still apply to the areas outside of the fence in the Modified I-15 Alternative. If these inspection or maintenance activities would be required in areas outside of the approved ROW grant, then supplemental environmental review and analysis would need to be implemented, and appropriate land use authorizations and permits would need to be acquired by the applicant.

Transmission System Interconnection and Upgrades

The transmission system requirements of the Modified I-15 Alternative would be exactly the same as those described in the DEIS for the proposed project (BSE 2010a). Although the total output of the facility would be reduced from 400 MW to 370 MW, the locations and capacities of the required gen-tie lines, Ivanpah substation, and switchyards with step-up transformers would all be the same as those required for the proposed project. The reduced output would also not affect the identified need and plan by SCE to upgrade approximately 36 miles of 115 kV transmission line to 230 kV. The EITP project is proposed to accommodate an anticipated 1400 MW of load generation by ISEGS and five other planned renewable energy projects in the area, and the

reduction of the ISEGS output from 400 MW to 370 MW would not be expected to affect the overall need for that project. The environmental impact of the EITP project is currently being evaluated by BLM and the CPUC, and is also considered as part of the analysis of cumulative impacts of the ISEGS project in Section 5 of this FEIS.

Telecommunications Facilities

The telecommunications infrastructure required to support the Modified I-15 Alternative would be exactly the same as that for the proposed project. For both alternatives, the infrastructure is necessary to provide protective relay circuit and a SCADA circuit for the proposed Ivanpah Substation, as well as data and telephone services. These services will be obtained by the construction of approximately eight miles of fiber optic cable from the ISEGS facility to Mountain Pass, along existing distribution line poles.

<u>Project Design and Management Approach</u>

Stormwater Management Approach

It is likely, but not certain, that the general approach to be used to address stormwater management would be the same for the Modified I-15 Alternative as for the proposed project. The reason for the uncertainty is because detailed stormwater modeling analysis has not been performed for the reconfigured Ivanpah Unit 3 site. As discussed in Section 3.6, reduction of potential stormwater impacts associated with the northern portion of Ivanpah Unit 3 was one element in the applicant's decision to propose the Mitigated Ivanpah 3 Alternative. The Modified I-15 Alternative would be similar in avoiding this area and its potential impacts. However, without detailed stormwater analysis, it is not certain whether the reconfigured location of Ivanpah Unit 3 in the Modified I-15 Alternative would be more or less favorable with respect to potential stormwater impacts. The applicant would likely intend to implement the same Low Impact Development approach to minimize the amount of grading, vegetation removal, soil compaction, and site disturbance during construction of the heliostat fields. However, if later stormwater analysis during the design phase indicated that the Low Impact Development approach was not applicable to the reconfigured Ivanpah Unit 3 area, then the applicant could choose to implement a more active stormwater management approach for this area.

Project Construction

In general, the sequence, procedures, and equipment used for project construction would be the same for the Modified I-15 Alternative and the proposed project. Because the acreage and infrastructure would be exactly the same, the duration of construction, required equipment and materials, and standards and procedures would also be expected to be the same. The reconfigured location of Ivanpah Unit 3 would not cause any substantive difference in site access or other characteristics associated with project construction.

The construction of the Modified I-15 Alternative would be subject to BLM Conditions of Approval as defined in the Record of Decision, Energy Commission Conditions of Certification, and permit and regulatory requirements of other state and federal agencies. These conditions would include provisions defined in the applicant's submittals for the proposed project, including:

- Draft Contractor Health and Safety Standards (CH2M Hill 2009c)
- Administrative Draft ISEGS Construction Stormwater Pollution Prevention Plan (CH2M Hill 2009d)
- Preliminary Draft Plan, Revision 2, Drainage, Erosion, and Sediment Control Plan (CH2M Hill 2009e)
- Draft Raven Management Plan, ISEGS (CH2M Hill 2008a)
- Draft Desert Tortoise Translocation/Relocation Plan for ISEGS (CH2M Hill 2009f)
- Application for Incidental Take Permit Under Section 2081 of the Fish and Game Code (CH2M Hill 2009g)
- Draft Biological Assessment for the ISEGS Project (CH2M Hill 2008b)
- Streambed Alteration Agreement Application (CH2M Hill 2009h)
- Weed Management Plan for ISEGS, Eastern Mojave Desert (CH2M Hill 2008c)

Facility Operation and Maintenance

The operation and maintenance of the facility, as developed under the Modified I-15 Alternative, would be the same as that for the proposed project. The specific operational procedures to be used in daily operations of Ivanpah Units 2 and 3 would differ, due to the different configurations and outputs of these Units in the Modified I-15 Alternative. The primary differences would include a reduction in the level of effort and water volume needed for heliostat washing, and a reduction in the amount of natural gas burned in the start-up boilers (BSE 2010a). By reducing the number of heliostats from 214,000 to 173,500 (a reduction of 19 percent), the amount of water used for heliostat washing during operations would also be reduced by approximately 19 percent. The start-up boilers would be reduced in size from 924.4 MMBtu/hr (two boilers at 231.1 and one boiler at 462.2 MMBTU/hr) in the proposed project to 693.3 MMBtu/hr in the Modified i-15 Alternative, a reduction in natural gas usage of 25 percent.

Like construction, the standards and procedures to be used during operation and maintenance would be subject to BLM Conditions of Approval as defined in the Record of Decision, Energy Commission Conditions of Certification, and permit and regulatory requirements of other state and federal agencies. These conditions would include provisions defined in the applicant's submittals for the proposed project, including:

- Draft Contractor Health and Safety Standards (CH2M Hill 2009c)
- Preliminary Draft Plan, Revision 2, Drainage, Erosion, and Sediment Control Plan (CH2M Hill 2009e)
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- Draft Biological Assessment for the ISEGS Project (CH2M Hill 2008b)
- Weed Management Plan for ISEGS, Eastern Mojave Desert (CH2M Hill 2008c)

Waste Management

The types of non-hazardous solid wastes generated during construction, operations, and closure of the facility under the Modified I-15 Alternative would be the same as those generated as part of the proposed project. All materials would be managed, recycled, and/or disposed of in the same manner for each alternative.

Hazardous Waste Management

The types of hazardous materials used during project construction and operations under the Modified I-15 Alternative would be the same as those generated as part of the proposed project. All materials would be managed, recycled, and/or disposed in the same manner for each alternative.

Project Decommissioning

The closure and decommissioning of the facility, as developed under the Modified I-15 Alternative, would be the same as that for the proposed project. Similar to construction, the duration of the closure would be reduced under the Modified I-15 Alternative, due to the reduced number of power tower receivers and heliostats that would require removal (BSE 2010a).

Like construction and operations, the standards and procedures to be used during closure and decommissioning would be subject to BLM Conditions of Approval as defined in the Record of Decision, Energy Commission Conditions of Certification, and permit and regulatory requirements of other state and federal agencies. These conditions would include provisions defined in the applicant's submittals for the proposed project, including:

- Closure, Revegetation, and Rehabilitation Plan - Revision 3 (CH2M Hill 2010)
- Draft Contractor Health and Safety Standards (CH2M Hill 2009c)
- Preliminary Draft Plan, Revision 2, Drainage, Erosion, and Sediment Control Plan (CH2M Hill 2009e)
- Draft Raven Management Plan, ISEGS (CH2M Hill 2008a)
- Application for Incidental Take Permit Under Section 2081 of the Fish and Game Code (CH2M Hill 2009g)
- Draft Biological Assessment for the ISEGS Project (CH2M Hill 2008b)
- Weed Management Plan for ISEGS, Eastern Mojave Desert (CH2M Hill 2008c).

3.2.4 No Action Alternative

The No Action alternative under NEPA defines the scenario that would exist if the project were not constructed. Under NEPA, the "no action" alternative is used as a benchmark of existing conditions by which the public and decision makers can compare the environmental effects of the proposed action and the alternatives.

If the No Action alternative were selected, the construction and operational impacts of the ISEGS project would not occur. There would be no grading of the site, no loss or disturbance of approximately 4,000 acres of desert habitat, and no installation of

extensive power generation and transmission equipment. The No Action alternative would also eliminate the proposed project's contributions to cumulative impacts in the Ivanpah Valley and in the Mojave Desert as a whole. However, the EITP project would still be implemented, so the impacts associated with that action would still occur.

In the absence of the ISEGS project, however, other power plants, both renewable and nonrenewable, would have to be constructed to serve the demand for electricity. If the No Action alternative were chosen, other solar renewable power plants may be built, and the impacts to the environment would likely be similar to those of the proposed project because solar renewable technologies require large amounts of land and similar slope and solarity requirements as the proposed ISEGS project. The No Action alternative may also lead to siting of other non-solar renewable technologies to help achieve the California Renewable Portfolio Standard.

Additionally, if the No Action alternative were chosen, it is likely that additional gas-fired power plants would be built or that existing gas-fired plants could operate longer. If the project were not built, California would not benefit from the reduction in greenhouse gases that this facility would provide. PG&E would not receive the 300-MW contribution to its renewable state-mandated energy portfolio and SCE would not receive the 100-MW renewable energy contribution.

California's Renewable Portfolio Standard has been implemented to reduce greenhouse gas emissions from gas- or coal-fired power plants. While the ISEGS project as proposed would have substantial impacts as a result of the extent of its disturbance, the facility is proposed to be located in an area of the desert that is not protected for specific wildlife species or for its wilderness values. In addition, substantial other development is proposed in the Ivanpah Valley. In the absence of the ISEGS project, other renewable or gas-fired power plants would likely be constructed to serve the electricity demand that could be met with the ISEGS project. Given these factors and the importance of solar technology as a tool in reducing greenhouse gases, the No Action alternative is not superior to the proposed ISEGS project.

3.3 Alternatives Considered but Eliminated from Detailed Analysis

This section summarizes the other alternatives that were considered by BLM, but were not retained for detailed evaluation. For each alternative, this section describes the operation and features of the alternative, as well as the rationale for elimination of the alternative from detailed analysis and comparison of impacts to the proposed project. However, although these alternatives were eliminated from the detailed analysis, this section also provides a summary of their expected environmental impacts, including comparisons to those associated with the proposed project.

Alternative sites for the ISEGS project were suggested in the AFC and in scoping comments and were developed by BLM and Energy Commission staff. The origin of each alternative is explained below. The National Parks Conservation Association and National Park Service suggested consideration of a site west of Clark Mountain, thus offering a buffer between the project site and the Mojave National Preserve. Multiple scoping comments suggested consideration of a private, already disturbed site. The following alternative sites are considered in this analysis and can be seen in **Figure**

3.15. Following are the alternatives considered by BLM, but eliminated from detailed analysis:

Site Alternatives

- Siberia East alternative
- Broadwell Lake alternative
- Private Land alternative
- Ivanpah Site A alternative
- Ivanpah Site C alternative
- West of Clark Mountain alternative
- Ivanpah Playa alternative

Renewable Solar Alternatives

- Parabolic Trough Technology
- Stirling Dish Technology
- Linear Fresnel Technology
- Solar PV Technology
- Distributed Solar Technology

Other Renewable Alternatives

- Wind energy
- Geothermal energy
- Biomass energy
- Tidal energy
- Wave energy

Alternative Methods of Generating or Conserving Energy

- Natural Gas Generation
- Coal Generation
- Nuclear Energy
- Conservation and Demand Side Management

Alternative Project Implementation

- Phased Approval alternative

3.3.1 Site Alternatives

3.3.1.1 Siberia East Alternative

Description

The Siberia site was considered in the AFC as an alternative to the ISEGS site. The site is also the subject of a separate application to BLM for a solar power facility. BrightSource Energy submitted an Application for Transportation and Utility Systems and Facilities on Federal Lands to the BLM on April 30, 2007, to develop up to 1,600 MW of solar power at this site.

For the purposes of this alternatives analysis, an area of approximately 4,000 acres on the eastern half of the BrightSource Siberia site has been identified as an alternative to the ISEGS project. It is called herein the *Siberia East alternative*. The alternative site is located entirely on BLM land, approximately 8.5 miles southeast of the town of Ludlow and immediately west of National Trails Highway (Route 66). Interstate 40 is located approximately 5 miles north of the Siberia East alternative. The site is bordered on the northeast side by the National Trail Highway and a Burlington Northern Santa Fe (BNSF) railroad.

Figure 3.16 shows the regional location of the Siberia East alternative and **Figure 3.17** shows a more detailed map of the location of the Siberia East alternative. Alternatives **Figure 3.16** also shows the federal land parcels that were acquired by BLM from Catellus with funds from The Wildlands Conservancy, other donors and the federal government. The Siberia East alternative would not be located on any Catellus lands.

The Siberia East alternative is located on BLM public lands, managed under the principle of multiple use and sustainable yield, and designated Multiple Use Class M (Moderate) for a controlled balance between more intense land use and protection of public lands. It is located on the eastern edge of the BLM Western Mojave Planning area, just west of the NEMO Planning area.

The land use in the immediate area of the alternative site area is open space, public land. The nearest residences are in Ludlow, California (population 10 in 2000) and approximately 8.5 miles northwest of the Siberia East alternative (U.S. Census 2008). The Bagdad Chase Mine is located approximately six miles west of the site and is owned and controlled by Bagdad Chase, Inc. The mine shares an access road to the western half of the Siberia site as proposed in the BLM application.

Rationale for Elimination

Both the Siberia East and Ivanpah Valley sites are the subject of current applications by BrightSource for solar generating facilities. Because the scale of current solar, wind, and other renewable energy facilities is on the order of 100 to 500 MW, BLM is considering and processing multiple renewable energy applications in order to achieve the objectives of the EPAct, which encourages the Department of the Interior (BLM's parent agency) to approve at least 10,000 MW of renewable energy on public lands by 2015. To be a reasonable alternative to the proposed project, implementation of the Siberia East application in place of the ISEGS application would have to be clearly superior, in terms of environmental impacts, and this is not the case. Because it would likely have substantially similar effects to the proposed project, the Siberia East site is not retained for further analysis as an alternative. The implementation of this alternative would not provide the proponent with the means to satisfy the timing conditions of their contractual obligations in their power purchase agreements, making Siberia East ineffective in meeting the applicant's objectives.

Environmental Impact Summary

Air Quality. The construction and operation emissions resulting from building and operating a 400-MW solar power plant at the Siberia East alternative site would be similar to the emissions for the ISEGS project at Ivanpah Basin and would be subject to permit requirements and require mitigation to avoid or reduce adverse air quality impacts. However, during the construction period, commuting emissions would likely be greater for the Siberia East alternative site than for the proposed ISEGS site.

Biological Resources. Approximately 4,000 acres of Mojave creosote scrub and other native plant communities would be permanently lost by vegetation clearing, grading, and construction of the solar facilities, potentially affecting special status animal species. No surveys were performed at this site, but given the size of the site, it is likely that impacts to listed or sensitive plant species would result from direct or indirect loss of habitat. Indirect loss of individuals may occur in instances such as sediments transported (e.g., from cleared areas during rain events) that cover adjacent plants or changes in a plant's environment that cause its loss (e.g., adjacent shrubs that provided necessary shade are removed). Additional impacts would occur due to the construction and operation of linear facilities associated with a solar facility at the Siberia East

alternative site. However, definitive conclusions about the extent of impacts cannot be made in the absence of surveys and project design information.

Cultural Resources. Detailed surveys of the site have not been performed. However, based on site records, one known resource, National Trails Highway, would potentially be affected by construction and operation of a solar facility at the Siberia East alternative site. The presence of a solar facility at the Siberia East site would result in indirect visual impact to the historic architectural resources such as the National Trails Highway (SBR-2910H). This resource has been recommended eligible for the National Register of Historic Places (NRHP). Mitigation Measures such as those required for the ISEGS project in Section 5.4 may reduce this impact; specific site surveys would be required to be certain. It is not known what cultural resources, if any, would be affected by development of a solar facility at the Siberia East alternative site; however, it is reasonable to assume that resources exist and would be uncovered at some places of this site (AIC 2008). Definite conclusions about the potential for adverse impacts cannot be made because of the absence of site-specific survey and project design information.

Land Use. As with the proposed ISEGS site, the Siberia East alternative would not physically divide an established community. The proposed ISEGS site is located in areas that are designated Multiple-Use Class L (Limited Use) while the Siberia East alternative site is located in areas that are designated Multiple-Use Class M (based upon a controlled balance between higher intensity use and protection of public lands). While Multiple-Use Class L is more restrictive than Multiple-Use Class M, both allow for solar energy plants after complying with NEPA requirements.

Recreation. There is a high level of recreational use at the proposed ISEGS site; the Ivanpah Dry Lakebed alone is visited by an estimated 5,000 visitors annually. Recreation and wilderness impacts would be less severe at the Siberia East alternative site because the site is less intensely used for recreation.

Socioeconomics. Most of the socioeconomic impacts of the ISEGS project at the Siberia East alternative site would be similar to building and operating the project at the proposed site. However, because of the limited housing options at the Siberia East alternative site compared with the proposed site, accommodations for the construction workers at the Siberia East alternative would create greater construction impacts than at the proposed ISEGS site.

Traffic and Transportation. Impacts to traffic and transportation at the Siberia East alternative site would be similar to those at the proposed ISEGS site; however, the Siberia East alternative site would not require the use of Interstate 15 east of Barstow during the highly congested Friday afternoon time period. As such, the Siberia East alternative site would not contribute to an adverse cumulative impact on traffic and transportation to northbound Interstate 15 during Friday afternoons as would the ISEGS site.

Visual Resources. The site would be prominently visible from the National Trails Highway (Route 66), particularly for westbound traffic. Travelers would see the site from a distance and there is little elevation or natural contouring to block the solar power towers. The ridges on the northern border of the MCAGCC would border the site to the south and as such would block the Siberia East alternative from sensitive viewers to the south.

The proposed Ivanpah site is preferred over the Siberia East alternative site because while Siberia East would be visible to fewer people than the proposed ISEGS site, it would be located in a much more remote and pristine area. The ISEGS project is located in an area with substantially more development and use because of its location along Interstate 15, adjacent to Primm, Nevada, and adjacent to heavily used recreation areas. As a result, a large solar project in the Siberia East area would create a more dramatic change to the visual environment than would occur at the ISEGS site.

Waste Management. The environmental impacts of waste disposal at the Siberia East alternative site would be similar to those at the proposed ISEGS site at Ivanpah. While the Siberia East alternative is closer to the Barstow Sanitary Landfill, the Ivanpah site has the option of using two additional landfills in Nevada (see Section 5.14).

Geology, Paleontology and Minerals. The peak bedrock ground acceleration is higher for the Siberia East alternative than for the proposed ISEGS site at Ivanpah Basin as the (see the Energy Commission's PSA for details regarding the geologic hazards and peak ground acceleration).With the exception of stronger ground shaking, the Siberia East alternative site is subject to geologic hazards of similar magnitude as the Ivanpah Basin site. Strong ground shaking could be effectively mitigated through facility design. The potential to encounter paleontological resources at the Siberia East alternative site is similar to the Ivanpah Basin site.

Transmission System Engineering. Locating a solar facility at the Siberia East alternative would require re-evaluating the capacity of the SCE transmission lines that would be used for interconnection. This alternative may cause adverse effects to the SCE transmission system and require system upgrades. Moreover, it may not accomplish the project goal to be on line in 2011 because of grid improvement constraints.

Summary of Impacts. Without more site-specific information about biological and cultural resources at the Siberia East alternative, a detailed comparison of sites for those disciplines is not possible. It is assumed that impacts to soils and water at the Siberia East alternative would be similar to those at the proposed Ivanpah Basin site; however, it is uncertain if there is groundwater available at the Siberia East alternative site.

The Siberia East alternative would have impacts similar to the proposed ISEGS site at Ivanpah Basin for Air Quality (operational impacts and most construction impacts), Hazardous Materials, Noise & Vibration, Visual Resources, Public Health & Safety, Transmission Line Safety and Nuisance, Waste Management, Worker Safety and Fire Protection, Facility Design, Power Plant Design, Efficiency and Reliability. While definitive conclusions about the extent of Biological Resource impacts cannot be made in the absence of surveys and project design information, the existing information regarding the Siberia East site suggest that there would likely be similar levels of adverse impacts to desert tortoise at this site as there would be for ISEGS.

The Siberia East alternative would be less preferred than the proposed ISEGS site at Ivanpah Basin for air quality (commuting impacts during construction impacts only), socioeconomics, geology, paleontology and minerals, and transmission system engineering. The Siberia East alternative would be preferred to the proposed ISEGS site at Ivanpah Basin for land use, recreation, and traffic and transportation.

3.3.1.2 Broadwell Lake Alternative

Description

The Broadwell Lake site was considered as an alternative to the ISEGS site and as a site for a potential future solar facility (CH2M Hill 2007). Independently, BrightSource submitted an Application for Transportation and Utility Systems and Facilities on Federal Lands to the BLM on January 25, 2007 to develop up to 500 MW of solar power at this site (BSE 2007a). A September 18, 2009 newspaper article stated that BrightSource has "ceased all activity at the Broadwell site" due to the consideration of the area for a future national monument (San Francisco Chronicle 2009).

The Broadwell Lake alternative would be located on BLM land, approximately 8.5 miles north northwest of Interstate 40 at Ludlow. The Broadwell Lake alternative is located in unincorporated San Bernardino County, approximately 1.5 miles east of the Kelso Dunes Wilderness, approximately 7 miles north-northwest of the Bristol Mountains Wilderness, and approximately 1 mile west of the Broadwell Dry Lake. National Trails Highway (Route 66) and Interstate 40 are located approximately 8.5 miles south of the alternative site, and the historic Tonopah and Tidewater Railroad is located approximately 7 miles south of the site. **Figure 3.16** shows the regional location of the Broadwell Lake alternative and **Figure 3.18** shows the Broadwell Lake in greater detail. **Figure 3.16** also indicates federal lands that had been obtained from Catellus with funds from The Wildlands Conservancy, other donors and the federal government. The Broadwell Lake alternative would be located on some parcels previously owned by Catellus.

The Broadwell Lake alternative as defined in this EIS is located on BLM public lands, which are managed under the principle of multiple use and sustainable yield and are designated Multiple Use Class L (Limited) and M (Moderate) for a controlled balance between higher intensity use and protection of public lands (BLM 2008a). The site is located within the NEMO Planning Area. The elevation of the site is approximately 1,300 feet above mean sea level. The site would be accessed via Crucero Road, a one-lane dirt road with an exit off Interstate 40 (DWR 2004a).

Broadwell Dry Lake is located approximately one mile east of the site. The land use character of the immediate alternative site area is open space and public land. The eastern portion of the dry lake and the mountains to the east are designated as wilderness—BLM's Kelso Dunes Wilderness Area.

The nearest residences are in Ludlow, CA (population 10 in 2000), approximately 7.5 miles south of the Broadwell Lake alternative (US Census 2008). The nearest schools are in Newberry Springs, approximately 32 miles away.

Rationale for Elimination

BLM is not considering this site further because the site may not be feasible, as it may be included within the proposed Mojave Trails National Monument, should that proposal be adopted. Development of solar projects is likely to be in consistent with the policy objectives for the management of that area, should it be approved. The applicant (BrightSource Energy) has requested that evaluation of this site be placed on hold pending a decision on monument legislation.

Environmental Impact Summary

Air Quality. The construction and operation emissions resulting from building a 400-MW solar power plant at the Broadwell Lake alternative site would be similar to the construction required for the construction of the ISEGS project at Ivanpah Basin and would be subject to permit requirements and require mitigation to avoid or reduce adverse air quality impacts. Emissions from the commute of the construction workers would likely be greater at the Broadwell Lake alternative than at the proposed Ivanpah Basin site.

Biological Resources. Detailed biological surveys of this alternative have not been completed. However, approximately 4,000 acres of Mojave creosote scrub and other native plant communities would be permanently lost to the siting of a solar facility at Broadwell Lake by vegetation clearing, grading, and construction of the solar facilities. Such a siting also would likely result in losses of habitat for special-status plant and animal species as a result from loss of habitat. Indirect loss of individuals may occur in instances such as sediments transported (e.g., from cleared areas during rain events) that cover adjacent plants or changes in a plant's environment that cause its loss (e.g., the removal of shrubs that provided necessary shade). Additional impacts would occur due to the construction and operation of linear facilities associated with a solar facility at the Broadwell Lake alternative site, including a one-mile transmission line and a two-mile gas pipeline. While definite conclusions about the potential for adverse impacts cannot be made because of the absence of site-specific survey and project design information, based on its vegetation and surveys of nearby sites, there would likely be similar adverse impacts to desert tortoise at the Broadwell Lake site as there would be at the proposed ISEGS site.

Cultural Resources. Twenty known archaeological, architectural, or historical sites would potentially be affected by construction and operation a solar facility at the Broadwell Lake alternative site. Mitigation Measures such as those required for the proposed ISEGS project in Section 5.4 of this EIS may reduce this impact; however, specific site surveys would be required to be certain. Unknown, unrecorded cultural resources may be found at the Broadwell Lake alternative site. It is not known what cultural resources, if any, would be affected by development of a solar facility at the Broadwell Lake alternative site; however, it is reasonable to assume that resources exist and would be uncovered at some places in this site (AIC 2008). Definite conclusions about the potential for adverse impacts cannot be made because of the absence of site-specific survey and project design information.

Land Use. As with the proposed Ivanpah Basin site, the Broadwell Lake alternative would not physically divide an established community. The proposed ISEGS site is located in areas that are designated Multiple-Use Class L (Limited Use) while the Broadwell Lake alternative site is located in areas that are designated Multiple-Use Class L and M (based upon a controlled balance between higher intensity use and protection of public lands). While Multiple-Use Class L is more restrictive than Multiple-Use Class M, both allow for solar energy plants after complying with NEPA requirements.

The alternative site would have no impact with respect to farmland conversion; however, the Broadwell Lake alternative site would be located within the Cady Mountain

Grazing Allotment (Cady Mountain, allotment #08006). The Broadwell Lake alternative 4,000-acre property boundary area is part of a larger 97,560-acre (150 square mile) BLM grazing allotment. As stated in Section 5.17, pursuant to Title 43 Code of Federal Regulations, section 4110.4-2(2)(b) Grazing Administration, the process to withdraw a BLM grazing lease to allow development requires a two-year notification be given to the lease holder prior to the start of development.

Recreation. Recreationists at the Bristol Mountains Wilderness and at the Kelso Dunes Wilderness would have an unobstructed view of the ISEGS project were it built at the Broadwell Lake alternative site. Additionally, recreationists at the Cady Mountains and Afton Canyon Natural Area would have a distant view of the power towers. Because of the relatively pristine nature of these recreation areas, the ISEGS project would introduce an industrial nature to the region dissimilar to any existing facilities. While potentially fewer recreationists visit the region surrounding the Broadwell Lake alternative than the proposed Ivanpah Basin site, the recreationists visiting the Broadwell Lake alternative are likely searching for undisturbed desert landscape and wilderness. As such, there may be potential impacts to recreational resources at the Broadwell Lake alternative similar to the proposed project.

Socioeconomics. Most of the socioeconomic impacts of the ISEGS project at the Broadwell Lake alternative site would be similar to building and operating the project at the proposed site. However, because of the limited housing options in the Ludlow area as compared with the proposed site, accommodations for the construction workers at the Broadwell Lake alternative would create greater impacts than at the proposed Ivanpah Basin site.

Traffic and Transportation. Impacts to traffic and transportation at the Broadwell Lake alternative site would be similar to those at the proposed Ivanpah Basin site; however, the Broadwell Lake alternative site would not require the use of Interstate 15 east of Barstow during the highly congested Friday afternoon time period. As such, the Broadwell Lake alternative site would likely have fewer impacts than the Ivanpah Basin site on traffic and transportation.

Visual Resources. The proposed Ivanpah site would be located in an area that is much less remote and more developed, and further from designated wilderness. The Ivanpah Basin site is located in an area with substantially more development and use because of its location along Interstate 15 adjacent to Primm, Nevada, and to heavily used recreation areas. As a result, a large solar project in the Broadwell Lake area would create a more dramatic change to the visual environment than would occur at the Ivanpah Valley site.

Waste Management. The environmental impact of waste disposal at the Broadwell Lake alternative site would be the similar to that at the Ivanpah Basin site. While the Broadwell Lake alternative is closer to the Barstow Sanitary Landfill, the Ivanpah Basin site has the option of using two additional landfills in Nevada (see Section 5.14 of this EIS).

Transmission System Engineering. Locating a solar facility at the Broadwell Lake alternative site would require re-evaluating the capacity of the SCE transmission lines that would be used for interconnection. This alternative may cause adverse effects to

the transmission system and require system upgrades. Moreover, it may not accomplish the project goal to be on line in 2011 because of grid improvement constraints.

Summary of Impacts. Surveys for biological and cultural resources have not been conducted at the Broadwell Lake alternative, so a detailed comparison is not possible. Details on surface water flow are also not available, but given the topography and soils, it is assumed that most impacts to soils and water at the Broadwell Lake alternative would be similar to those at the proposed Ivanpah Basin site. However, it is unknown if there is groundwater available at the Broadwell Lake alternative site.

The Broadwell Lake alternative would have similar impacts as the proposed Ivanpah Basin site for air quality (operation and most construction impacts), hazardous materials management, visual resources, land use, recreation, noise, public health, transmission line safety and nuisance, waste management, worker safety and fire protection, facility design, power plant efficiency and power plant reliability. While definitive conclusions about the extent of Biological Resource impacts cannot be made in the absence of surveys and project design information, there would likely be similar levels of adverse impacts to desert tortoise at the Broadwell Lake sites as there would be for ISEGS.

The Broadwell Lake alternative would be less preferred than the proposed Ivanpah Basin site for Air Quality (for construction commuting only), Socioeconomics & Environmental Justice, Geology, Paleontology and Minerals, and Transmission System Engineering. The Broadwell Lake alternative would be preferred to the proposed Ivanpah Basin site for Traffic and Transportation.

3.3.1.3 Private Land Alternative

Description

Multiple scoping comments requested that an alternative site be considered on disturbed private land in order to minimize the loss of more pristine public lands. The applicant evaluated three private land alternatives in its AFC (Harper Lake, Lucerne Valley, and Rabbit Lake alternatives; see **Figure 3.15**). All of these sites were eliminated from further consideration by the applicant because they would have required completing option-to-purchase agreements with multiple private owners. BrightSource felt that obtaining site control with numerous owners would have been time-consuming and risky (CH2M Hill 2007). Only one of the private sites, Harper Lake, had sufficient land for a 400 MW facility with the configuration of the proposed project; however, one of the major land owners at the site requested too much money to make the site economically feasible.

A Private Land Alternative was evaluated in the Energy Commission's PSA, but eliminated from consideration based on the number of private parcels that would be required to assemble enough land for a large project. Comments on the PSA requested that the Private Land alternative be analyzed in more detail; this section responds to those comments. Because this alternative was not discussed in detail in the PSA, the analysis of this alternative in this EIS presents more detail than for other alternatives.

There are limited areas where undeveloped contiguous private land parcels exist within the California desert with the appropriate slope and solarity requirements. One of these areas is the triangular land area east of Barstow, bounded by I-15 on the north, I-40 on

the south, and BLM land on the east. The western portion of this area was identified as a disturbed area by the RETI Phase 2 maps and includes the towns of Daggett and Yermo (both about 12 miles east of Barstow), the Barstow-Daggett Airport, and the Marine Corps Logistics Base (MCLB). The Mojave River passes through the northern portion of the triangle, and its floodplain ranges from about 2,000 feet to one mile wide. The river parallels I-15 on a northeasterly trend.

Figure 3.19A shows this area of private land. The western portion of this land area is the location of the first two solar power tower facilities of the Solar Electric Generating System (SEGS), built in Daggett by LUZ Industries. The location adjacent to these original SEGS facilities was considered for a possible Private Land Alternative, incorporating approximately 2,000 acres of agriculture land. However, sufficient disturbed land is not available to build a 400 MW solar power facility without interfering with a number of existing residential areas. Additionally, the area surrounding the original SEGS facilities is located within 2,000 feet of the Barstow-Daggett Airport and would potentially conflict with the Federal Aviation Regulation Part 77 – Objects Affecting Navigable Airspace, specifically the surface structure height would potentially obstruct or impede air navigation. The Barstow-Daggett area also includes undisturbed private land, rural residences, and a few private water ski lakes. Based on these restrictions in the western portion of the area, an area in the northeastern portion was selected for evaluation as the Private Land alternative. **Figure 3.19B** is a more detailed map of this potential site.

A Private Land alternative would require approximately 900 acres for each of the two 100 MW Phases and approximately 1,800 acres for the 200 MW phase. An additional approximately 100 acres would be required for a shared administrative building, operations and maintenance building, substation, and detention ponds. Approximately 300 acres is required for construction staging activities. The total footprint of the ISEGS project on private lands would be approximately 4,000 acres (approximately 6.25 square miles).

While all parcels at the location shown in **Figure 3.19A** are not for sale, there are large parcels of land (500 acres or more) in the general vicinity that are listed on a number of real estate websites.[1] Approximately 0.5 miles west of the Private Land alternative, at the intersection of Interstate 15 and Manix Rd, there is one square mile lot for sale specifically targeting solar and wind energy. While large lots of land are available in the vicinity of Daggett or Newberry Springs, a number of criteria would need to be met to make it most likely that the available land would be suitable for solar development.

To meet the alternative site criteria allowing development of a project the same size as the proposed ISEGS project, approximately 4,000 acres of land would be required. To minimize land use impacts, the land should avoid conflicting with existing rural residences and existing airports. While disturbed agricultural land is located in the Newberry Springs and Daggett communities, much of this land is located near the Barstow-Daggett Airport. Other already disturbed land is located in Newberry Springs

[1] See Trulia Real Estate Search at http://www.trulia.com/property/1045905451-Lot-Land-Yermo-CA-92398 and Land Watch at http://www.landwatch.com/San-Bernardino-County-California-Land-for-sale/pid/1343937 (Accessed May 9, 2009) and http://www.loopnet.com/property/16038677/I-15-and-Manix-Rd/ (Accessed May 28, 2009) for the one square mile parcel targeting solar and wind energy providers.

south of the Mojave River. This area has a much greater density of rural residences, including water ski lakes with residences adjacent. In order to minimize land use conflicts, a site north of the Mojave River and south of Interstate 15 was selected as the Private Land alternative. The site is made up of disturbed agricultural land and private and public open space.

The Private Land alternative would be located on private land with a few BLM parcels included, south of and adjacent to Interstate 15 in the community of Harvard, north of Newberry Springs. Interstate 40 is located approximately 7 miles south of the alternative site. The Private Land alternative has appropriate insolation and minimal slope. The elevation of the site is approximately 1,800 feet above mean sea level. The site would be accessed via Harvard Road, off Interstate 15 at the Harvard Road exit. Additionally, there are several existing structures and residences on some of this private land, and removal of houses or other structures may be required.

The Private Land site would require acquisition of approximately 70 parcels, although the number of separate landowners may be fewer. Due to the number of parcels that would have to be acquired, this alternative would be substantially more challenging for an applicant to obtain site control (in comparison to BLM land). The applicant would have to negotiate separately with multiple landowners. The Draft Phase 2a Report published by the Renewable Energy Transmission Initiative (RETI) in early June 2009 identified private land areas for solar development only if there were no more than 20 owners in a two square mile (1,280 acre) area.

The Mojave River is located approximately 0.25 miles south of the site. The river is dry most of the year and flows only during the largest rain events. The land use character of the immediate alternative site area is open space and rural residential. Some public lands (BLM) occur within the site boundaries. There are lands owned by the CDFG just south of the site boundary. A Desert Wildlife Management Area (DWMA) for protection of desert tortoise is located north of the site on the north side of Interstate 15.

Approximately five residences are located within the site. The site would also be located adjacent to a low density residential area on east of Newberry Springs.

Like the proposed ISEGS project, the Private Land alternative would include a natural gas-fired start-up boiler to provide additional heat for plant start-up and during periods of cloud cover. The Private Land alternative would obtain natural gas by installing a pipeline to the Kern River Gas Transmission Pipeline approximately 3.3 miles north of the Private Land Alternative.

The SCE Cool Water-Dunn Siding 115 kV transmission line runs through the Private Land alternative site. The Private Land alternative would require either an interconnection and upgrade of the SCE Cool Water-Dunn Siding 115 kV transmission line or the construction of a new 10-mile 230 kV transmission line that would follow the existing corridor southwest to the Cool Water Substation. Additional transmission lines (between 287 kV and 500 kV) are located approximately two miles north of the Private Land alternative site on the northern side of Interstate 15.

Rationale for Elimination

The Private Land Alternative is not considered further in this EIS because its implementation is remote and speculative. Development of this site would depend upon

the ability of a developer to acquire multiple, contiguous private land holdings covering a large area, which is not likely to be feasible.

Environmental Impact Summary

Air Quality

Environmental Setting. Like the proposed ISEGS project, the Private Land alternative would be located within the Mojave Desert Air Basin, regulated by the Mojave Desert Air Quality Management District (MDAQMD). The Private Land alternative would be located in the Western Mojave Desert where ozone and particulate matter violate ambient standards, despite the low population density east of Barstow (EPA 2008a).

Environmental Impacts. Exhaust emissions from heavy-duty diesel and gasoline-powered construction equipment and fugitive particulate matter (dust) would be essentially the same at any site. Exhaust emissions would also be caused by workers commuting to and from the work sites, from trucks hauling equipment and supplies to the sites, and crew trucks (e.g., derrick trucks, bucket trucks, pickups). Workers and trucks hauling equipment and supplies would have to commute 20 miles (to Barstow) or 60 miles (to Victorville) to reach the Private Land alternative. The proposed project is located about 50 miles from Las Vegas, NV. Appropriate mitigation at the Private Land alternative site would likely involve similar, locally oriented recommendations such as the mitigation measures presented in Section 5.1 of this EIS.

Comparison to Proposed Project. The construction and operational emissions at the Private Land alternative site would be similar to those of the ISEGS project at Ivanpah Basin.

Biological Resources

Environmental Setting. The Private Land alternative is located in the desert region of unincorporated San Bernardino County within the BLM West Mojave Planning Area. The western Mojave Desert comprises a distinct area of the Mojave Desert biome, and flora and fauna have adapted to local conditions and formed distinct natural communities. Freezing temperatures occur on a limited basis in the winter, and summer temperatures regularly exceed 100 degrees. The desert habitat of San Bernardino County includes soils that are predominantly sandy gravel, as well as major dune formations, desert pavement, and dry alkaline lake beds (San Bernardino County 2007). The Mojave Desert region is characterized by arid conditions with low precipitation, and the eastern portion of the West Mojave Planning Area is crossed by expansive alluvial washes.

The West Mojave Planning Area supports a diverse array of plant and wildlife species because of the varied topography and landforms within the planning area (BLM 2005). The predominant aspect of the West Mojave is a flat, sparsely vegetated region interspersed with mountain ranges and dry lakes. The characteristic creosote bush and saltbush plant communities bloom during years of above-normal winter rainfall, and up to 90 percent of the flora is comprised of annual plants (BLM 2005).

The Private Land alternative would be located immediately north of the Mojave River. The Mojave River is in many ways the most prominent landscape feature of the West Mojave desert (BLM 2004). The now-dry river and playas of the historic Mojave River

supported species of invertebrates, fish, amphibians, and pond turtles, and attracted migratory birds dependent on water. Remnant populations of these animals are still present today, and comprise many of the rare species in the vicinity of the river. The ancient river and lakes formed sandy beaches and prevailing winds carried the finer particles to the east, forming hummocks and dunes. These blowsand areas now support unique species of insects, plants, and reptiles, including the Mojave fringe-toed lizard, whose entire distribution can be traced to the former path of the ancient Mojave River and Amargosa River (BLM 2004).

The Private Land alternative would be located immediately north of the CDFG Camp Cady Wildlife Area (BLM 2004). This site supports mesquite thickets and riparian forest, and protects western pond turtle, summer tanager, yellow-breasted chat, and a variety of birds of prey, especially in winter. Camp Cady includes habitat for Mojave tui chub, hawks, songbirds and shorebirds. Adjacent public and private lands on the west including the Private Land alternative contain blowsand deposits with the Mojave fringe-toed lizard (BLM 2004).

The Private Land alternative would be located on habitat that is considered suitable for the Mohave Ground Squirrel (CDFG 2005). The Mohave Ground Squirrel is restricted to the Mojave Desert in San Bernardino, Los Angeles, Kern and Inyo Counties and populations have been reduced by urban development, off-road vehicle use, and agriculture. Populations in the southwestern San Bernardino County appear to be extirpated (CDFG 2005).The Mohave Ground Squirrel was not identified in the California Department of Fish and Game Natural Diversity Database (CNDDB) data for this site.

A reconnaissance survey of the biological resources of the Private Land alternative was conducted on August 16, 2009 from public access roads which allowed visitation throughout the site. Mojave creosote bush scrub and atriplex scrub are the two dominate habitat types at the Private Land alternative site. The Private Land alternative also included some lands dominated by fallow and ruderal fields and developed areas. During this survey, a number of habitat characteristics were used to rate the quality of the habitat and the capacity to support desert tortoises. These include topography, soil texture, dominant shrubs, herb layer, plant diversity, likelihood of desert tortoise occurrence, likelihood of other special status species occurrence, quality of surrounding habitat, overall habitat quality for wildlife, and overall habitat quality for desert tortoise. Results of the survey show that the Private Land alternative site has varying habitat quality for desert tortoise and wildlife and is generally made up of unsuitable to medium quality habitat for desert tortoise.

The Private Land alternative had poor quality habitat for rare plants, except on Harvard Hill (where no impacts would be expected due to unbuildable slopes). Much of the Mojave River lacks any notable riparian vegetation. Even where riparian vegetation is good, impacts to wildlife using the river vegetation during breeding season from a solar facility up on the ridge of private lands was expected to be low. There is a buffer of perhaps 300-500 feet from river vegetation/active channel to buildable flats to north where the Private Land alternative could be expected to be built.

The following sensitive species occur in the vicinity of the alternative site (CNDDB 2009). Several species are noted because of the proximity to the Mojave River, which flows rarely.

- Southwestern pond turtle
- Vermilion flycatcher
- Mohave tui chub
- Desert tortoise
- Mojave fringe-toed lizard
- Parish's popcorn-flower
- Pallin bat
- Townsend's big-eared bats'

Environmental Impacts. Approximately 650 acres of the Private Land alternative are disturbed agricultural land. Approximately 3,350 acres of Mojave creosote scrub and other native plant communities would be permanently lost by vegetation clearing, grading, and construction of the solar facilities, potentially affecting special status animal species. Impacts to listed or sensitive plant species would result from direct or indirect loss of known locations of individuals or direct loss of habitat. Indirect loss of individuals may occur in instances such as sediments transported (e.g., from cleared areas during rain events) that cover adjacent plants or changes in a plant's environment that cause its loss (e.g., adjacent shrubs that provided necessary shade are removed). Additional impacts would occur due to the construction and operation of linear facilities associated with a solar facility at the Private Land alternative site, including a possible transmission line approximately 10 miles long and a 3.3-mile gas pipeline. In addition, this alternative is located near the Mojave River, so mitigation measures to protect river corridor species and habitat would be important.

Impacts/Mitigation to Wildlife—Overview

Building a solar facility at the Private Land alternative site would potentially have an adverse effect on listed and sensitive wildlife species and their habitats either directly or through habitat modifications. Any wildlife residing within the proposed project area would potentially be displaced, injured, or killed during project activities. Animal species in the project area could fall into construction trenches, be crushed by construction vehicles or equipment, or be harmed by project personnel. In addition, construction activities may attract predators or crush animal burrows or nests.

Migratory/Special Status Bird Species. Mojave creosote bush scrub at the power plant site provides foraging, cover, and/or breeding habitat for migratory birds, including special-status bird species that may be present at the site. Project construction and operation could impact nesting birds in violation of the Migratory Bird Treaty Act. Preconstruction surveys and avoidance of nesting birds could reduce such impacts.

Desert Tortoise. The Private Lands Alternative site is located in habitat of varying quality for desert tortoises. Although the habitat/plant community varies somewhat with elevation, slope, and soils, many areas have been heavily disturbed and some are actively farmed. Portions of the site are unsuitable for desert tortoises and other

portions range between low and medium quality habitat for desert tortoise. It is anticipated that the private lands alternative also provides unsuitable to medium quality habitat for other special status species that are known to occur in the area.

The Mojave River is located approximately one-half mile from the site. There are patches of well developed riparian habitat and areas of no and poorly developed riparian habitat. The proximity of the river to the project site would most likely result in increased bird activity in the area but this increase is not expected to result in adverse impacts. This site is of much less value to desert tortoise than the ISEGS and I-15 sites.

This notwithstanding construction and operation activities may result in direct or indirect impacts to the desert tortoise or its occupied habitat and mitigation measures similar to those required for the proposed ISEGS site would be required should the project be build at the Private Land alternative.

Mohave Ground Squirrel. Construction and operation activities may result in direct or indirect impacts to the Mohave ground squirrel or its occupied habitat. The project would result in potential take of individuals and permanent loss of up to 4,000 acres of habitat on the solar facility site. The project could also result in disturbance to nearby populations should there be any and increased road kill hazard from construction and operation traffic.

Human activities in the Private Land alternative project area potentially provide food or other attractants in the form of trash, litter, or water, which draw unnaturally high numbers of tortoise predators such as the common raven, kit fox, and coyote. Predation could be reduced through the preparation of a Raven Management Plan and other avoidance and minimization measures such as the mitigation measures presented in Section 5.3 of the EIS.

Spread of Noxious Weeds. Construction of a solar facility at the Private Land alternative site could result in the introduction and dispersal of invasive or exotic weeds. The permanent and temporary earth disturbance adjacent to native habitats increases the potential for exotic, invasive plant species to establish and disperse into native plant communities, which leads to community and habitat degradation. A weed reduction program could potentially reduce and mitigate impacts.

Noise. Noise from construction activities could temporarily discourage wildlife from foraging and nesting immediately adjacent to the project area. Many bird species rely on vocalization during the breeding season to attract a mate within their territory. Noise levels from certain construction, operations, and demolition activities could reduce the reproductive success of nesting birds.

Lighting and Collisions. Like the proposed project, the heliostat array at the Private Land alternative site would be arranged around centralized solar power towers 459 feet high, which would potentially include FAA-required lighting and a lightening pole that would extend above the top of the towers approximately 5 to 10 feet. Lighting may increase the collision risk because lights can attract nocturnal migrant songbirds. Bright night lighting close to the ground at the ISEGS project site could also disturb wildlife that occurs adjacent to the project site (e.g., nesting birds, foraging mammals, and flying insects).

Operation of a 10-mile transmission line could result in increased avian mortality due to collision with new transmission lines. Mitigation could include installing the transmission line in accordance with the Avian Powerline Interaction Committee (APLIC) Guidelines designed to minimize avian-power line interactions.

Definite conclusions about the potential for adverse impacts to biological resources cannot be made in the absence of site-specific survey and project design information.

Comparison to Proposed Project – Biological Resources

Overall, development of a solar project at the Private Land alternative site would likely impact slightly fewer biological resource compared to those of the proposed ISEGS project because approximately 650 acres of the alternative would occur on disturbed, agricultural land. The Private Land alternative site has varying habitat quality for desert tortoise and wildlife and is generally made up of unsuitable to medium quality habitat compared with the proposed ISEGS site which has a high quality desert tortoise and wildlife habitat. The Private Land alternative is preferred over the ISEGS for impacts to biological resources.

Cultural Resources

Environmental Setting. The Private Land alternative is located on a combination of agricultural land, undeveloped BLM land, and open space private land in San Bernardino County, California. The alternative site is located in the Mojave Desert and is located just north of the CDFG Camp Cady Wildlife Area. The California desert has been inhabited for at least 8,000 to 12,000 years and perhaps longer (BLM 2005). Prehistoric settlement was often centered on lakes, now the dry playas characteristic of the Mojave Desert and Great Basin. The lakes and marsh environments along the edges had abundant plant and animal species providing food, fibers, medicines, tools, clothing, and ritual objects required for daily life (BLM 2005). Closer to the Private Land alternative, the Mojave River was a significant focus of prehistoric settlement and the principal corridor for prehistoric travel and trade, particularly during the Protohistoric Period (A.D. 1200 to ca. A.D. 1850) (Moratto 1984, pp. 426–430).

From 8,000 to 6,000 years before present, climatic change caused the lakes to dry, and food gathering and land use patterns began that continued into the historic period, including a use of a greater variety of habitats, plants, and animals (BLM 2005). The bow and arrow may have appeared around 2,000 years ago as evidenced by a shift in projectile point types, and the expansion of bow-and-arrow technology is evidenced by the late prehistoric introduction of the Desert Side-Notched and Cottonwood Triangular points found through the California desert (BLM 2005). A pattern of exploitation of seasonally available resources resulted in the use of large areas by relatively small populations and left archaeological sites widely scattered (BLM 2005).

The first documented exploration of the Mojave Desert by nonindigenous people occurred in the mid-1700s by Francisco Garces, a Spanish Franciscan priest looking for a route from Arizona to Northern California (BLM 2005). Much of the history of this region is because of its use as a corridor, one used by fur trappers and caravans. California was annexed in 1848, the same year that gold was discovered, leading to an influx of prospectors (BLM 2005). Roads were established to transport goods, people,

livestock, food, and ore between the Mojave Desert and Los Angeles, and the western Mojave Desert began to have a large mining industry.

Railroad surveys began in 1853; the San Pedro, Los Angeles, and Salt Lake Line, predecessor to the Union Pacific through the Mojave Desert, was completed in 1905, and the Tonopah and Tidewater finished its line from Ludlow to Beatty, Nevada, in 1907 (BLM 2005). In 1914, a road was completed to parallel the tracks of the Atlantic & Pacific Railroad, which was the precursor to U.S. 66 (National Trails Highway).

Military bases were established in the desert prior to World War II, and large tracts were set aside for military use, including the MCAGCC (BLM 2005). Further information regarding this region can be found in Section 5.4 of the EIS.

One California State Historical Landmark is located immediately south of the Private Land alternative. Camp Cady (No. 963-1) was located on the Mojave Road which connected Los Angeles to Albuquerque. Non-Indian travel on this and the nearby Salt Lake Road was beset by Paiutes, Mohaves, and Chemehuevis defending their homeland. To protect both roads, Camp Cady was established by U.S. Dragoons in 1860. The main building was a stout mud redoubt. Improved camp structures were built 1/2 mile west in 1868. After peace was achieved, the military withdrew in 1871. This protection provided by Camp Cady enabled travelers, merchandise, and mail using both roads to boost California's economy and growth (OHP 2009). Much of the camp has been destroyed, and unrelated wooden structures exist onsite. The Camp Cady site today is bare of apparent evidences of early use, because a flood in 1938 washed away all traces of the original adobe structures.

A records search for the Private Land alternative at the San Bernardino Archeological Information Center of the California Historical Resources Information System reveals that the alternative, which is in and adjacent to the Mojave River floodplain, is in a landscape context that has a moderately high frequency of prehistoric archaeological sites. The Energy Commission conducted the records search on August 5, 2009, focusing on the Private Land alternative and areas four miles to the east and west along the Mojave River. The records search documents the presence of diverse archeological site types on the alluvial terraces that flank the river. The site types include habitation areas, village sites, and campsites, each of which may have food processing, lithic reduction, burial, and cremation components. Other site types typical on and beyond the terraces include lithic quarry sites, rock art sites, ceramic scatters, and trails.

The known prehistoric archaeological site distribution across the area of the Private Land alternative reflects both the frequency and the diversity of the site types in adjacent areas. Roughly 27 percent of the Private Land alternative appears to have been subject to reliable pedestrian surveys. The surveys document three prehistoric archaeological sites in or immediately adjacent to the area of the alternative, a moderately complex habitation area on the alternative that includes three food processing areas, one campsite, and one ceramic scatter (P1801-14), a village site found adjacent to the alternative in 1966 and destroyed by agriculture prior to 1980 (CA-SBR-2689), and a lithic quarry site related to the exploitation of toolstone available on Harvard Hill on the western portion of the alternative (CA-SBR-1933). The extrapolation of the archaeological site frequency for the known, roughly 27 percent sample of the

alternative would appear to indicate the potential presence of three to four times the number of known archaeological sites on the alternative.

Environmental Impacts. The construction and operation of a solar facility on the site of the Private Land alternative would appear likely to destroy one whole known prehistoric archaeological site and part of a second, and may destroy components of a third, and has the further potential to wholly or partially destroy a number of other prehistoric archaeological sites on portions of the alternative that have not yet been subject to pedestrian survey. One would need to establish the historical significance of the three known resources above and any additional ones that would be found as a result of the complete pedestrian survey of the alternative to comment more definitively on whether any of these resources would qualify for treatment under Federal and State regulatory programs. Given the historic significance of the Mojave River corridor during most of prehistory and the character of the diverse archaeological site types known for the Private Land alternative and adjacent areas, it is, however, reasonable to assume that the alternative would most likely have the potential to destroy significant prehistoric archaeological deposits. Federal and State regulatory programs would require treatment for all such deposits.

One historical archaeological site, Camp Cady (California State Historical Landmark No. 963-1), is known in the vicinity of the Private Land alternative. As the resource is roughly one half of a mile to the south of the alternative, it is relatively unlikely that the presence of a solar facility would result in an adverse impact to the particular values for which the resource may be significant. The primary value of the resource probably relates to the information that the careful excavation of the historical archaeological deposits that make up the camp would produce. The construction and operation of a solar facility on the Private Land alternative would not disturb or destroy any of these deposits. The historical archaeological deposits of Camp Cady could also potentially be found to have historical value for the association of the deposits with significant events or patterns in history. Were the deposits found to have such value, the potential for a nearby solar facility to degrade the visual integrity of the resource would have to be taken into account. The resolution of this issue would require further study.

There are a number of known built environment resources (buildings, structure, and linear infrastructure elements) in and near the Private Land alternative. The former San Pedro, Los Angeles, and Salt Lake Railroad, now the Union Pacific Railroad, and segments of the Old Spanish Trail, the Mormon Trail, and the Mojave Road are thought to run through the area of the alternative. Camp Cady Ranch is roughly one half of a mile south of the alternative. The presence of the trail and road segments on the alternative is presently unconfirmed, and the integrity of the railroad, trail and road segments, or Camp Cady Ranch is similarly unconfirmed. Further study of the resources could reveal that a solar facility on the Private Land alternative would have adverse physical and visual impacts on historically significant railroad, road, and trail segments that contribute respectively to the historic significance of each overall transportation route, and have a visual impact to Camp Cady Ranch.

Comparison to Proposed Project. The development of a solar facility on the site of the Private Land alternative would most likely have cultural resource impacts that far exceed those of the ISEGS project at the Ivanpah Basin. Whereas the ISEGS project would have an adverse impact to a portion of one historical resource, the Hoover Dam-

to-San Bernardino transmission line (CA-SBR-10315H), the construction and operation of a solar facility on the Private Land alternative has the real potential to wholly or partially destroy a number of significant prehistoric archaeological sites. The partial destruction or visual degradation of historical archaeological resources and built environment resources are other potentially adverse impacts of such a facility. More site-specific information about the cultural resources on the Private Land alternative would serve to better qualify this comparison.

Hazardous Materials

Environmental Setting. The topography of the Private Land alternative site is essentially flat, as are the immediately surrounding areas. Sensitive receptors are present within the Private Land alternative site, and a residential community is located adjacent to the southeast corner of the alternative site. Additional rural residences are located 0.5 miles north of the site north of Interstate 15, 2.5 miles west of the site, and 1 mile south of the site.

Access to the Private Land alternative would likely be via Interstate 15 from Barstow to the Harvard Road exit. At Harvard Road, transport would likely turn south onto Harvard Road and would continue southeast for approximately 1 mile through primarily open space and agriculture land.

Environmental Impacts. Hazardous materials use at the Private Land alternative, including the quantities handled during transportation and disposal, would be the same as those of the proposed project. As stated in Section 5.5 for the proposed project, hazardous materials used during the construction phase of the project would include gasoline, diesel fuel, motor oil, lubricants, and small amounts of solvents and paint. No acutely toxic hazardous materials would be used on site during construction, and none of these materials pose a potential for adverse off-site impacts as a result of the quantities on site, their relative toxicity, their physical states, and/or their environmental mobility.

Natural gas would be transmitted to the site via a new pipeline from an existing gas line approximately 3.3 miles north of the Private Land alternative and would likely require another 0.5 to 1.5 miles of pipeline to reach the power block depending on the site layout.

Transportation of hazardous materials to the Private Land alternative site would require passing near residences located in the town of Barstow, approximately 20 miles from the Private Land alternative. However, the transportation would be primarily on Interstate 15 and not on smaller road with residences. The transportation route from Interstate 15 on Harvard Road would be primarily through open space.

Comparison to Proposed Project. The hazardous materials that would be used at the Private Land alternative site would be the same as those used at the proposed ISEGS site; however, the Private Land alternative site has sensitive subgroups within a five-mile radius. As such, the potential impacts at the Private Land alternative would likely be somewhat greater. Compared to the proposed project, selecting the Private Land site would result in slightly greater impacts from transportation of hazardous materials. With adoption of the proposed mitigation measures, the Private Land alternative would

comply with all applicable laws and regulations, and result in no adverse impacts to the public.

Land Use

Environmental Setting. The Private Land alternative would be located on private open space land containing a few rural residences and agricultural lands, and would also include approximately 900 acres of unclassified BLM land. The San Bernardino General Plan Land Use designation for the area is Rural Living. The intended use of Rural Living is to provide sites for rural residential uses, incidental agriculture uses, and similar and compatible uses. The primary purpose of the Rural Living Land Use District is to identify areas and encourage appropriate rural development, and prevent inappropriate demands for urban services. Electrical power generation is an allowed use on Rural Living land with a Conditional Use Permit (San Bernardino 2009).

The Private Land alternative would be located on approximately 320 acres of Prime Farmland and approximately 150 acres of Farmland of Statewide Importance (DOC 2006). The Private Land alternative would impact no lands under Williamson Act contracts (San Bernardino County 2008). Approximately 650 acres of the Private Land alternative are or were used for agricultural purposes.

Approximately 900 acres of the Private Land alternative are BLM land, and approximately 2,450 acres are private open space lands. The BLM land is within the BLM Western Mojave Planning Area, the purpose of which is to develop management strategies for the desert tortoise, Mohave ground squirrel and over 100 other sensitive plants and animals throughout the western Mojave Desert.

Approximately five rural residences exist on the Private Land alternative; however, during a site visit it appeared that some of the residences may not be occupied. There is a large private religious camp (Ironwood) located near the alternative site.

Environmental Impacts. Like the ISEGS proposed site, a key land use plan affecting this project is the U.S. Bureau of Land Management's CDCA Plan of 1980, as amended. The Private Land alternative, as stated above, is located within areas of the CDCA West Mojave Plan on land that has not been classified by the BLM, and that would not be subject to the Plan.

Additionally, the Private Land alternative would be located within San Bernardino County Land Use designation Rural Living. As stated above, electrical power generation is an allowed use in a Rural Living area with a Conditional Use Permit which would require a General Plan Amendment to apply the Energy Facilities Overlay (San Bernardino 2009).

Based on the site review, there are approximately 650 acres of productive agricultural uses on the Private Land alternative project site or which approximately 320 acres are considered Prime Farmland. The construction and/or operation of the proposed project would result in a removal of approximately 650 acres of actively-used agriculture land. The construction and operation of the solar power plant would eliminate existing agricultural operations and foreseeable future agricultural use. This loss of agricultural lands is a potentially adverse impact, and would require a mitigation measure potentially requiring purchase of an equivalent number of acres of farmland.

The Private Land alternative would be build on land that currently has approximately five houses and related agricultural facilities located on the site. It is not certain if the houses are currently occupied, and some of the housing structures appeared abandoned during the site visit. The Newberry Springs area has a total of 1,522 housing units (US Census 2009). The five houses within the Private Land alternative represent less than one percent of the housing units in the Newberry Springs area. If this area were purchased for the purpose of constructing a solar project, the residences would likely be demolished. The landowners cannot be compelled to sell, since BrightSource does not have eminent domain powers, and the current owners would be compensated based on the negotiated sale price of the property. Therefore, while the removal of the five homes by the project would result in a loss of residential dwelling units and associated agricultural facilities, this impact is not considered to be adverse.

One group of residences is located within 1,000 feet of the Private Land alternative, east of the intersection of Troy Road and Cherokee Street. Construction activities for the alternative would create temporary disturbance to these residential areas (i.e., heavy construction equipment on temporary and permanent access roads and moving building materials to and from construction staging areas). Mitigation Measures to reduce noise and air quality impacts are presented in Sections 5.1 and 5.7 for the proposed ISEGS site. However, these measures would not eliminate the disturbance to nearby residences. While this disturbance would be temporary at any one location, impacts would be adverse if construction was not carefully managed and residents not kept informed.

Comparison to Proposed Project. Selecting the Private Land alternative site would result in greater impacts to land use than would the ISEGS Ivanpah Basin site because approximately five residences would potentially require demolition. Additionally, approximately 650 acres of agricultural land would be removed from production, and there would be construction and operational impacts to the nearby religious camp. Additional mitigation measures to offset loss of agricultural lands would be required.

Recreation and Wilderness

Environmental Setting. The Private Land alternative site would be located immediately adjacent to the California Department of Fish and Game Cady Camp Wildlife Area. The Cady Camp Wildlife Area is approximately 1,870 acres of desert riparian habitat with opportunities for hiking and bird watching along with dove, quail, and rabbit hunting (DFG 2009). Camping is allowed at the Cady Camp headquarters and at the Harvard Road "dove" field. Cady Camp Wildlife Area hosts a variety of Game Bird Heritage Program Special Hunts such as a Junior Pheasant Hunt and a Family Pheasant Hunt in the 2007-2008 season (DFG 2009).

A number of man-made water ski lakes are located in the vicinity of the Private Land alternative. The nearest lake is located southeast of the eastern border of the Private Land alternative adjacent to the Cady Camp Wildlife Area.

The BLM Manix ACEC is located approximately two miles east of the Private Land alternative. The Manix ACEC was established in 1990 by the BLM to protect paleontological and cultural resources. The site also contains terminus of the Mojave Road, which is used by off-highway vehicles.

Environmental Impacts. The Private Land alternative would be located adjacent to the northern border of the CDFG Cady Camp Wildlife Area, and one to three miles north of ski lakes in the Newberry Springs area. Because of the flat topography and the close proximity of the Private Land alternative to the Cady Camp Wildlife Area, the solar power plant would be visible from the Wildlife Area.

Project construction activities would create a number of temporary conditions that may dissuade recreationists from visiting the Cady Camp Wildlife Area. Noise, dust and heavy equipment traffic generated during construction activities would negatively affect a visitor's enjoyment of the recreation area. The location of construction equipment may temporarily preclude access to recreation areas, especially in the vicinity of Harvard Road and in the Harvard Road "dove" field. Disturbances to recreational activities would potentially cause a temporary reduction of access and visitation during construction activities.

Construction of the 4,000 acres of heliostats and solar power towers would change the character of the Cady Camp Wildlife Area. While the wildlife area is located in an area that is zoned Rural Living, few residences are located immediately adjacent to the wildlife area except on the eastern border. Presence of the heliostats and power towers would contrast with the existing open space and agriculture areas north of the Cady Camp Wildlife Area. The heliostats and power towers would also result in a long-term visual impact to travelers and recreationists in this region. The noise and activity of the solar power plant may potentially scare hunting prey and preclude hunting at the Cady Camp Wildlife Area.

Comparison to Proposed Project. Both the proposed site and the Private Land alternative are located adjacent to Interstate 15, and both are located in areas with existing recreational use. There is a golf course adjacent to the proposed site, and the Ivanpah Dry Lakebed is visited by an estimated 5,000 visitors annually for land sailing. There is a less intense, but still high level of recreational use near the Private Land alternative. Recreation and wilderness impacts would be similar at the Private Land alternative than at the ISEGS site because of the close proximity between the Private Land alternative and the Cady Camp Wildlife Area and the recreational water ski lakes in the communities of Newberry Springs and Harvard. No natural or man-made feature would block the alternative site from view at the wildlife area. Use of the wildlife area as a hunting ground may no longer be possible should the Private Lands alternative be chosen. Overall, recreation impacts at the two sites would be similar.

Noise and Vibration

Environmental Setting. Generally low levels of ambient noise exist along the southern portion of the Private Land alternative area, as this portion of the site is primarily undeveloped open space and not adjacent to the freeway. Low noise levels under 50 dBA generally are expected to occur on these lands, which are used for agriculture with scattered rural residences. Noise levels would be elevated along the northern boundary of the project due to the presence of heavily traveled Interstate 15. For the majority of the Interstate 15 freeway corridor, a 65 dBA contour extends approximately 100 to 150 feet in either direction from the centerline (FRA 2009).

Intermittent noise is expected to occur at the eastern side of the Private Land alternative where the alternative site is to be located near a small residential community.

Nearby sensitive receptors include the residential community adjacent to the Private Land alternative southeast corner and the Cady Camp Headquarters which is also used for camping. The nearest residential area would be about 500 feet from the alternative site boundary, immediately adjacent to the southeast corner of the Private Land alternatives between the alternative and the Mojave River.

Environmental Impacts. As stated in Section 5.7 of this EIS, the construction of the ISEGS plant would create noise, or unwanted sound. The character and loudness of this noise, the times of day or night at which it is produced, and the proximity of the facility to sensitive receptors combine to determine whether the facility would meet applicable noise control laws and ordinances and whether it would cause adverse environmental impacts.

The noise experienced at any specific receptor during operation of a solar facility on this site would depend on which facility components were closest to the receptor. The heliostat arrays would not create operational noise, but the power block would create more noticeable noise.

If built in accordance to mitigation measures similar to those proposed for the ISEGS site, adverse noise impacts to sensitive receptors from construction and operation would be reduced or eliminated.

Comparison to Proposed Project. Given the proximity of both sites to the I-15 freeway, the baseline noise levels are elevated. However, the Private Land alternative would be in a location with more nearby sensitive receptors than the proposed site, so impacts at that site would be more severe at the alternative site.

Public Health and Safety

Environmental Setting. The Private Land alternative site is located in an isolated desert area. The nearest small community is located immediately adjacent to the southeast corner of the Private Land alternative site.

Environmental Impacts. While the meteorological conditions and topography at the site are not exactly the same as at the applicant's proposed site, they are similar enough that the results of air dispersion modeling and a human health risk assessment for the Private Land alternative site would be similar to that found for the proposed site. The cancer risk and hazard indices are much below the level of significance at the point of maximum impact, so the project would be unlikely to pose an adverse impact to public health at this location.

Comparison to Proposed Project. There is no substantial difference between this location and the proposed site for public health and safety.

Socioeconomics and Environmental Justice

Environmental Setting. Like the proposed ISEGS site, the Private Land alternative is located in San Bernardino County. The demographic characteristics of San Bernardino County are described in Section 5.9 of the EIS.

Environmental Impacts. Because of the limited population in Harvard and Newberry Springs, construction workers would most likely be from larger nearby cities such as Victorville and Barstow. The construction workers would most likely have to commute

20 to 50 miles or more daily to reach the construction site due to the limited housing availability in the Harvard and Newberry Springs region. There are no hotels in Newberry Springs, although RV camp sites are available. An additional option would be to erect temporary housing in the immediate area of the Private Land alternative site; however, this would increase the construction impacts and require provision of additional services such as electricity, water, and food. Because it is unlikely that the construction workers would relocate to the Newberry Springs or Harvard region, the Private Land alternative would not cause an adverse socioeconomic impact on the area's housing, schools, police, emergency services, hospitals, and utilities.

There would be no adverse socioeconomic impacts since most of the construction and operation workforce is within the regional labor market area, and construction activities are short-term. Benefits from the ISEGS project, should it be built at the Private Land alternative, are likely to be similar to the benefits from ISEGS in the Ivanpah Valley. Benefits include increases in sales taxes, employment, and income for San Bernardino County.

Comparison to Proposed Project. The socioeconomic impacts of the ISEGS project at the Private Land alternative site would be similar to building and operating the project at the proposed site.

Soil and Water Resources

Environmental Setting. Soils in the San Bernardino County Desert Region are primarily sandy gravel with low runoff coefficients and fast percolation (San Bernardino County 2006). The desert habitat of San Bernardino County includes soils that are predominantly sandy gravel and include major dune formations, desert pavement, and dry alkaline lake beds (San Bernardino County 2007).

The entire region is crossed by alluvial wash deposits. Desert soils are susceptible to erosion where disturbed due to the limited vegetation and low moisture content, as well as common high winds and infrequent high-intensity rainfall events that may occur (San Bernardino County 2006).

The Private Land alternative lies within the Lower Mojave River Valley Groundwater Basin (DWR 2004b). The Lower Mojave River Valley Groundwater Basin underlies an elongate east-west valley with the Mojave River flowing occasionally through the valley from the west across the Waterman fault and the existing valley to the east through Afton Canyon. Precipitation is between 4 to 6 inches with the average for the basin near 4 inches. Water-bearing deposits in this basin are predominantly unconfined (DWR 2004b). Wells yield range from 100 to 4,000 gpm and the average yield is about 480 gpm. The basin is bounded by the Camp Rock-Harper Lake, Calico-Newberry and Pisgah fault zones which form barriers or partial barriers to groundwater flow. Historically springs were located on the west side of many of these faults but most are no longer flowing because of a decline in the water table (DWR 2004b). In the northeastern portion of the basin relatively shallow clay layers result in shallow water levels near Camp Cady.

The published total storage capacity of the Lower Mojave River Valley Groundwater Basin varies. DWR calculated the total storage capacity for the Troy and Daggett storage units as 7,950,000 acre feet (DWR, 2004b). The Mojave Water Agency

calculated a total storage capacity of approximately 9,010,000 acre feet for the Lower Mojave River Valley Groundwater Basin (DWR 2004b).

Environmental Impacts - Soil Erosion Potential by Wind and Water. As stated in Section 5.10 of this EIS, construction activities can lead to adverse impacts to soil resources including increased soil erosion, soil compaction, loss of soil productivity, and disturbance of soils crucial for supporting vegetation and water-dependent habitats. Activities that expose and disturb the soil leave soil particles vulnerable to detachment by wind and water. Soil erosion results in the loss of topsoil and increased sediment loading to nearby receiving waters. Access to the Private Land alternative site would be via the Harvard Road and would not require any additional access road to reach the site. While the volume of earth movement is unknown at this time, the topography and slopes of the Private Land alternative and the Ivanpah Basin site are similar. Therefore, it is expected that the large footprint and extensive grading required for the facilities would be similar at both the Ivanpah and Private Land alternative sites, and similar erosion and sedimentation control methods would be used at both sites. Because of the high erosion potential of the desert soil, impacts to the soils at the Private Land alternative site would likely be adverse and require mitigation similar to the mitigation required at the Ivanpah Basin site. Low Impact Development principles would likely be used at this site, as at the ISEGS site, and grading plans, a Storm Water Pollution Prevention Plan (SWPPP), and a Drainage Erosion and Sediment Control Plan (DESCP) would be required. While grading plans, a SWPPP, and a DESCP would potentially reduce or avoid adverse impacts, near final grading plans, the SWPPP, and the DESCP would need to be prepared and reviewed to be certain this would be feasible.

Environmental Impacts - Storm Water. As stated in Section 5.10, potentially adverse water quality impacts could occur during construction, excavation, and grading activities if contaminated or hazardous soil or other materials used during construction were to drain off site. The Private Land alternative site is in primarily undeveloped area with some farmland. Brush would be cleared prior to grading. The storm water runoff percolates either into the soil or into flows overland off site. Impacts from storm water runoff would likely be similar to those at the Ivanpah Basin site because of the high volume of earth displacement and the long duration for construction. Similar mitigation measures would be required.

Environmental Impacts - Project Water Supply. It is unlikely that groundwater would be encountered during grading activities as the recorded depth to groundwater in the Lower Mojave River Valley Groundwater Basin is between 50 and 800 feet. However, as stated above relatively shallow clay layers result in shallow water levels near the Private Land alternative site. The volume of groundwater required for construction would be similar to that required for constructing the projects at the Ivanpah Basin location; however, there is a general trend in this basin for declining groundwater levels. While it is unknown at this time if there is sufficient groundwater available in the Lower Mojave River Valley Groundwater Basin to meet the construction and operation requirements of the Private Land Alternative, BLM expects that water use associated with current agriculture practices would be higher than the annual volume of water required of the project. With the makeup of the Private Land site including 320 acres of Prime Farmland and approximately 150 acres of Farmland of Statewide Importance, the

existing water use for agriculture is expected to likely be greater than the average project operational water demand of 100 acre-feet/year.

Environmental Impacts - Wastewater. Groundwater would be needed during construction of the ISEGS project at the Private Land alternative. Once used, this water would be reused to the extent possible and then discharged as wastewater. Improper handling or containment of construction wastewater could cause a broader dispersion of contaminants to soil or groundwater. The discharge of any nonhazardous wastewater during construction would be required to be in compliance with regulations for discharge. Water that could not be reused would be transported to an appropriate treatment facility. With implementation of required regulations, adverse impacts would be avoided or reduced.

Comparison to Proposed Project. Due to the large footprint and extensive grading required for the solar facility at both the ISEGS and Private Land alternative sites, similar erosion and sedimentation control methods would be used at both sites. Impacts to soil and water erosion would be similar at the two sites. Based on the current water use for agriculture, it is expected that sufficient water is available at the Private Land alternative site.

Traffic and Transportation

Environmental Setting. The Private Land alternative would be located adjacent to Interstate 15. Access to this site would be via Interstate 15 to the Harvard Road exit in Harvard, then approximately 1 mile south on Harvard Road. The Private Land alternative site entrance would most likely be from Harvard Road. A Union Pacific railroad track is located adjacent to Interstate 15. Workers employed to construct the project at this alternative site would most likely commute from Barstow (20 miles) or Victorville (60 miles). Given the freeway access, there would not likely be added traffic on the Interstate 15 east of the site (towards Las Vegas).

Environmental Impacts. Similar to the ISEGS project at Ivanpah Basin, before construction could occur for the Private Land alternative, a construction traffic control and transportation demand implementation program would need to be developed in coordination with Caltrans. This analysis may result in the need to limit construction-period truck and commute traffic to off-peak periods to avoid or reduce traffic and transportation impacts. These impacts would likely be less severe than those of the proposed project because construction at the Private Land alternative would not require travel on Interstate 15 east of Barstow, and the Interstate15 areas with most severe congestion would not be affected.

The project would potentially impact the Union Pacific right-of-way because it would be located less than one mile south of an active railroad right of way. Impacts to rail operations would be avoided or reduced through proper coordination with local agencies. Additionally, this rail line could potentially be used as a means of bringing in the materials required for the project.

Additionally, the Private Land alternative would be approximately 0.5 miles from a landing strip located on BLM land. This may require additional marking and lighting along the power towers in order to ensure safety of aircraft.

Comparison to Proposed Project. Impacts to traffic and transportation at the Private Land alternative site would be similar to those at the proposed ISEGS site; including the use of Interstate 15 east of Barstow. However, the Private Land alternative site would not require the use of Interstate 15 east of Barstow for the highly congested Friday afternoon time period. Because of its location closer to sources of workers in the Victor Valley and Barstow, the Private Land alternative site would likely have fewer impacts on traffic and transportation than those the Ivanpah Basin site.

Transmission Line Safety and Nuisance

Environmental Setting. The Private Land alternative would connect with the SCE transmission system by two possible options. The first would be through an interconnection with the existing SCE 115 kV transmission line that crosses the site; this would require a transmission line upgrade to 230 kV. The second option would be to construct a 230 kV transmission line for approximately 10 miles southwest to the existing SCE Cool Water Substation in Daggett. The new transmission line would follow the existing 115 kV corridor. The Private Land alternative site is in uninhabited open space, agriculture land, and some rural residences crossed by a BLM utility corridor. BLM utility corridors are typically between two and five miles wide to provide flexibility in selecting alternative routes for rights-of-way (BLM 1999). As with the ISEGS Ivanpah Valley site, the Private Land alternative would be able to tap into the Kern River Gas Transmission Company pipeline approximately 3.3 miles north of the Private land site.

Environmental Impacts. Similar to the proposed project, this alternative would not be likely to cause transmission line safety hazards or nuisances. As stated in Section 5.12, the potential for nuisance shocks would be minimized through grounding and other field-reducing measures that would be implemented in keeping with current standard industry practices, and the potential for hazardous shocks would be minimized through compliance with the height and clearance requirements of CPUC's General Order 95. Compliance with Title 14, California Code of Regulations, section 1250, would minimize fire hazards, while the use of low-corona line design, together with appropriate corona-minimizing construction practices, would minimize the potential for corona noise and its related interference with radio-frequency communication in the area around the route. As with the proposed ISEGS transmission lines, the public health significance of any related field exposures cannot be characterized with certainty. However, the proposed lines' design and operational plan would be adequate to ensure that the generated electric and magnetic fields are managed to an extent the CPUC considers appropriate in light of the available health effects information.

Comparison to Proposed Project. The Private Land alternative site would potentially require a longer transmission line interconnection with the SCE transmission system should a new transmission line be built. The increased length and proximity to sensitive receptors would likely increase the impact of the transmission interconnection at the Private Land alternative site.

Visual Resources

Environmental Setting. The alternative site parallels Interstate 15, and a 115kV transmission line crosses the alternative site from southwest to northeast. There are few buildings in the area; they include scattered rural residences and the Cady Camp

Headquarters are located near the alternative site. The transmission line and the freeway introduce a more developed and industrial feature to the otherwise rural setting.

Nearby views from the Private Land alternative site to the south, west and east are of undisturbed desert landscape crossed by a few unpaved roads, some agriculture lands, and some rural residential areas. A berm crosses the Private Land alternative along the northern boundary, along which are located railroad tracks, approximately one mile south of I-15. Further views become more residential once the community of Newberry Springs comes into view. Elevation rises to the east of the site, eventually becoming the foothills of the Cady Mountains. More rural communities are located north of Interstate 15 within viewing distance of the site in addition to a number of other major transmission lines paralleling the freeway.

Environmental Impacts. As stated in Section 5.13, the Energy Commission, in coordination with BLM, applied the BLM Visual Resource Management (VRM) system of visual assessment to the proposed ISEGS site at Ivanpah Basin. The existing visual setting baseline under the VRM methodology is characterized in terms of Visual Resource (VR) Classes. Under the VRM system, areas of the project viewshed are delineated and mapped based on broadly uniform characteristics of visual quality, viewers' sensitivity, and distance from project to viewers. These delineated areas are then assigned a VR Class (from I through IV). VR Classes are analogous to Overall Sensitivity ratings under the Energy Commission method and are used to determine an area's visual objective, that is, the level of project-caused contrast that is acceptable, above which contrast could constitute a potentially adverse impact. The BLM land areas considered for the Private Land alternative have not been assigned a VR Class so a formal impact determination under BLM's system cannot be made.

For the non-BLM land (the bulk of the Private Land alternative), visual impact analysis would be based on a comparison of the area's visual sensitivity with the added industrial features added by the solar project at this location. With the addition of the project, views of the desert and rural communities would change from a relatively undisturbed desert landscape to a substantially more industrial, highly altered one, dominated by roughly four square miles of mirror-arrays and 459-foot-tall solar collector towers, graded areas, and retention ponds, as well as light rays reflected off ambient atmospheric dust and the bright glow of the receiving portions of the solar collectors. There would be no natural features to block the view of the solar facilities on any side.

The site would be prominently visible from Interstate 15, for both westbound and eastbound traffic. Travelers would see the site from a distance although the berm that is located along the northern boundary of the project would potentially block some of the heliostats from view. The berm is not tall enough to block the solar power towers. . Additionally, because of the shape of the site (see Figure 5B), Interstate 15 would run the entire length of the solar power plant making the visible components more visually intrusive to westbound and eastbound traffic.

The linear facilities associated with the Private Land alternative site include a gas pipeline approximately three miles long and a potential 230-kV transmission line approximately 10 miles long. Construction of the gas pipeline would create a visible scar across the desert landscape that would remain for many years, even with restoration efforts. The transmission line would follow the existing utility corridor and would roughly

parallel an existing 115 kV transmission line for 10 miles until reaching the SCE Coolwater Substation and would be prominently visible from Interstate 15. The Private Land alternative interconnection would introduce additional industrial character to the Interstate 15 corridor.

Comparison to Proposed Project. The Private Land site is preferred over the proposed ISEGS site. While the solar power towers at the Private Land alternative site might be slightly more visible to riders along Interstate 15, it would be located in a more urban setting near existing communities and some of the project components would be potentially blocked by an existing berm. The proposed ISEGS site would be visible to heavily used recreation areas including wilderness areas within the Mojave National Preserve. While the Private Land site would be prominently visible to the Cady Camp Wildlife Area, views from this camp to the south and east are already relatively built up due to the communities of Harvard and Newberry Springs which surround the site. As a result, a large solar project in the ISEGS area would create a more dramatic change to the visual environment than would occur at the Private Land site.

The Private Land alternative transmission line would create a visual impact similar to that of the Ivanpah Basin transmission interconnection. The interconnection transmission line at the Private Land alternative would potentially be longer than the Ivanpah Basin transmission interconnection, but would be located adjacent to an existing line in an existing corridor.

Waste Management

Environmental Setting. As stated in Section 5.14, hazardous and nonhazardous solid and liquid waste, including wastewater, would be generated at the ISEGS project during construction and operation of the solar power plant. Waste would be recycled where practical and non-recyclable waste would be deposited in a Class III landfill. The nearest waste disposal facility that could potentially accept the nonhazardous construction and operation wastes generated by the project is the Barstow Sanitary Landfill in Barstow, California. The remaining capacity for the disposal facility is 924,401 cubic yards, and the Barstow Sanitary Landfill Expansion plan is currently undergoing environmental review (CIWMB 2008).

The hazardous waste generated during this phase of the project would consist of electrical equipment, used oils, universal wastes, solvents, and empty hazardous waste materials (CH2M Hill 2007, section 5.14.1.2). Universal wastes are hazardous wastes that contain mercury, lead, cadmium, copper, and other substances hazardous to human and environmental health. Examples of universal wastes are batteries, fluorescent tubes, and some electronic devices. Section 5.14.4.2.2 of the ISEGS AFC discusses the two Class I landfills that accept hazardous wastes and are open in California: the Clean Harbor Landfill (Buttonwillow) in Kern County and the Chemical Waste Management Landfill (Kettleman Hills) in Kings County. The Kettleman Hills facility also accepts Class II and Class III wastes. In total, there is in excess of 11 million cubic yards of remaining hazardous waste disposal capacity at these landfills, with approximately 30 years of remaining operating lifetimes.

Environmental Impacts. Construction at the Private Land alternative site would require excavation of fill material that underlies the site similar to that of the proposed project. Both nonhazardous and hazardous wastes would be created by the construction of the

ISEGS project at the Private Land alternative in similar quantities as at the proposed ISEGS site and would be disposed of at appropriate facilities. As with the proposed ISEGS site, the applicant would be required to obtain a unique hazardous waste generator identification number for the site prior to starting construction and would be required to comply with similar mitigation measures. The project would produce minimal maintenance and plant wastes.

All nonhazardous wastes would be recycled to the extent possible, and nonrecyclable wastes would be regularly transported off site to a local solid waste disposal facility. Generation plant wastes include: oily rags, broken and rusted metal and machine parts, defective or broken electrical materials, empty containers, and other miscellaneous solid wastes, including the typical refuse generated by workers. As with the proposed project, all construction and operation activities would need to be conducted in compliance with regulations pertaining to the appropriate management of wastes. The total amount of nonhazardous waste generated from the project is estimated to be less than 300 cubic yards of solid waste from construction, and approximately 250 cubic yards per year from operation. This would contribute less than 4 percent of the available landfill capacity. The disposal of the solid wastes generated by the ISEGS can occur without adversely impacting the capacity or remaining life of any of these disposal facilities.

Like nonhazardous wastes, hazardous wastes would be recycled to the extent possible. The four tons of hazardous waste from the ISEGS requiring off-site disposal would not adversely impact the capacity or remaining life of the Class I waste facilities. Similar to the proposed project, the project would need to implement a comprehensive program to manage hazardous wastes and obtain a hazardous waste generator identification number (required by law for any generator of hazardous wastes).

Comparison to Proposed Project. The environmental impacts of waste disposal at the Private Land alternative site would be similar to those at the proposed ISEGS site at the Ivanpah Basin. While the Private Land alternative would be closer to the Barstow Sanitary Landfill, it would also be closer to sensitive receptors, specifically the rural residences that would border the southeast corner of the site.

Worker Safety and Fire Protection

Environmental Setting. The Private Land alternative site would be located within an area that is open space. The area is currently served by the San Bernardino County Fire Department. See Section 5.15 for more information regarding the San Bernardino County Fire Department. The fire risks of this alternative would be similar to those of the proposed Ivanpah Basin site as both have similar habitat and desert conditions and both sites are adjacent to a heavily used transportation corridor.

Environmental Impacts. Similar to the proposed Ivanpah Basin project, it would be appropriate for a solar plant at Private Land alternative to provide a Project Demolition and Construction Injury and Illness Prevention Program and a Project Operations Safety and Health Program in order to ensure adequate levels of industrial safety. The applicant would also be required to provide safety and health programs for project construction, operation, and maintenance, similar to the requirements for the proposed Ivanpah Basin project site. Also similar to the proposed project, the San Bernardino County fire department would be contacted to assure that the level of staffing,

equipment, and response time for fire services and emergency medical services are adequate.

Comparison to Proposed Project. The environmental impact of worker safety and fire protection at the Private Land alternative site would be similar to that at the proposed Ivanpah Basin site.

Geology, Paleontology and Minerals

Environmental Setting. The Private Land alternative site is located in an area mapped as Pleistocene nonmarine, dune sand, and alluvium along with limited undivided Miocene nonmarine areas (USGS 2008). No known geologic resources or active mineral resources exist at the Private Land alternative site.

The Manix fault, a left-lateral, strike slip located on the southeast side of and sub-parallel to Interstate 15 in the community of Manix between Barstow and Baker, crosses the site (USGS 2008). The Manix fault is active; in April 1947 a M6.5 earthquake occurred on the Manix fault. The length of the surface rupture was approximately 3 miles and the maximum slip was approximately 5 centimeters.

The Bedrock Peak Ground Acceleration (10% in 50 years) at the Private Land alternative site is 0.27g (CGS 2009). This includes faults within 100 miles of the solar plant site and estimates of potential seismic ground motion. The peak bedrock ground acceleration is higher for both the Private Land alternative than for the proposed ISEGS site at Ivanpah Basin. An active fault runs through the Private Land alternative site which has experienced a M6.5 earthquake and the fault is considered capable of producing a M7.0 earthquake.

Environmental Impacts. Seismic ground shaking is probable at the alternative site because the Manix fault crosses the site. The severity and frequency of ground shaking associated with earthquake activity at the Private Land alternative is higher than at the proposed Ivanpah Basin site. As such, more stringent design criteria may be required for the Private Land alternative in accordance with a design-level geotechnical report and California Building Code (2007) standards. Adequate design parameters for the facility would need to be determined through a site-specific evaluation by a Certified Engineering Geologist or Geotechnical Engineer. Impacts due to seismic hazards and soil conditions would be addressed by compliance with the requirements and design standards of the California Building Code. The potential for liquefaction exists in San Bernardino County in areas where relatively loose, sandy soils exist with high groundwater level during long duration, high seismic ground shaking. While few areas within the desert region of the county have potential for liquefaction, there is potential for liquefaction along the Mojave River and along the Private Land alternative (San Bernardino 2009).

The paleontological sensitivity and potential to encounter significant paleontological resources in Quaternary alluvium at the alternative site and the Ivanpah Basin site is similar. As stated in Section 5.16, construction of the proposed project will include grading, foundation excavation, utility trenching, and possibly drilled shafts. There exists the probability of encountering paleontological resources. As with the Ivanpah Basin site, the proposed mitigation measures are designed to mitigate any paleontological resource impacts.

Comparison to Proposed Project. With the exception of stronger ground shaking and potential for liquefaction, the Private Land alternative site is subject to geologic hazards of similar magnitude as the Ivanpah Basin site. Strong ground shaking could be effectively mitigated through facility design. The potential to encounter geologic resources and significant paleontological resources at both alternative sites is similar to the Ivanpah Basin site. The mitigation measures provided in Section 5.16 would be applicable to the Private Land alternative.

Transmission System Engineering

Locating a solar facility at the Private Land alternative would require re-evaluating the capacity of the SCE transmission lines that would be used for interconnection. This alternative may cause adverse effects to the SCE transmission system and require system upgrades. Moreover, it may not accomplish the project goal to be on line in 2011 because of grid improvement constraints.

Summary of Impacts. The Private Land alternative would have impacts similar to the proposed ISEGS site at Ivanpah Basin for air quality, hazardous materials management, recreation, public health, socioeconomics, transmission line safety and nuisance, waste management, worker safety and fire protection, facility design, power plant efficiency, geology and paleontology, and power plant reliability.

The Private Land alternative would be preferred to the proposed ISEGS site at Ivanpah Basin for biological resources, visual resources, and traffic and transportation. The Private Land alternative would be less preferred than the proposed ISEGS site at Ivanpah Basin for cultural resources, land use (including agriculture), noise, and transmission system engineering.

It is assumed that impacts to soils and water at the Private Land alternative would be similar to those at the proposed Ivanpah Basin site; however, it is uncertain if there is groundwater available at the Private Land alternative site.

3.3.1.4 Ivanpah Site A Alternative

<u>Description</u>

Ivanpah Site A was identified by BrightSource in the AFC as a potential alternative site. It was not pursued as the proposed site because it is located partly on state land, further complicating the land leasing and permitting process; had a longer interconnection with the Kern River gas transmission line; would require more grading; and was found to be slightly less environmentally preferred by the applicant (CH2M Hill 2007). It is located adjacent to and southwest of the proposed ISEGS site in the Ivanpah Valley, in the southern portion of the NEMO Planning Area; see **Figure 3.15**. Ivanpah Site A overlaps the ISEGS site in a portion of BLM sections totaling approximately one square mile, and it also includes one section (Section 16) of state land under the jurisdiction of the California State Lands Commission.

The setting of Ivanpah Site A is very similar to that of the ISEGS site, as illustrated by the close proximity and overlapping of the two sites. They are both adjacent to the Ivanpah Dry Lake and the Primm Valley Golf Club, northeast of the Mojave National Preserve and approximately five miles from the California/Nevada border. The elevation of Ivanpah Site A is between 3,600 feet and 3,100 feet, as compared with between

3,150 to 2,850 feet for the proposed site. The sites share similar habitats and similar biological and cultural concerns (CH2M Hill 2007). Both Ivanpah Site A and the proposed site would be visible from the Mojave National Preserve, Interstate 15, and the Clark Mountains.

Rationale for Elimination

This alternative is not considered further by BLM because it would have substantially similar effects to those of the proposed project.

Environmental Impact Summary

Ivanpah Site A would require a large amount of land and would result in the permanent loss of approximately 3,800 acres of desert habitat in the same region as the proposed ISEGS site. Given the proximity of Ivanpah Site A to the proposed ISEGS, it is reasonable to assume that the impacts to desert tortoise and barrel cacti would occur and be similar at both sites in the approximately one square mile of overlapping region between the two sites.

Impacts to land use and recreation at the Ivanpah Site A would be similar to impacts of the proposed ISEGS site because they are both equally distant from the Ivanpah Dry Lake and other recreational activities in the Ivanpah Valley. Like the proposed ISEGS site, Ivanpah Site A is located within the CDCA and NEMO Planning Areas and may conflict with these plans. Ivanpah Site A would also be located on some state lands, which may cause permitting difficulties (CH2M Hill 2007).

Both the proposed ISEGS site and Ivanpah Site A would have a large footprint and require extensive grading, potentially resulting in erosion and runoff. However, the Ivanpah Site A has a somewhat greater slope, being located nearer to the Clark Mountains, and would therefore require somewhat greater grading and would potentially have a greater impact to soils and water. Ivanpah Site A is the same distance as the proposed ISEGS site from Ivanpah Dry Lake and would be visible from the dry lake, a resource frequently used for recreation (CH2M Hill 2007). Additionally, because Ivanpah Site A is closer to the Mojave National Preserve than the proposed ISEGS site (less than one mile away) it would also result in visual impacts to the preserve and to recreationists within the preserve (including from the Clark Mountains) that are similar to those at the proposed site. Given the size of the power plants and the height of the receiver power towers, approximately 459 feet tall for the three power plants, visual impacts would be considerable and similar to those at the proposed ISEGS site. In addition, Ivanpah Site A is closer to I-15 than the ISEGS facility, so visual impacts would be greater for passing motorists.

Due to the proximity between the ISEGS site and the Ivanpah Site A, impacts of the Ivanpah Site A would be similar to the proposed project. However, Ivanpah Site A would be closer to Interstate 15 and to the Mojave National Preserve. This results in increased visibility from these sensitive areas. Also, a longer interconnection with the Kern River gas transmission line would be required, thereby increasing any impacts associated with the linear connection, including ground disturbance.

3.3.1.5 Ivanpah Site C Alternative

Description

Ivanpah Site C was identified in the AFC as a site considered by BrightSource. It was not pursued as the proposed site because the interconnections to both the Kern River gas transmission line and SCE transmission line would be longer, the site offered little flexibility for layout revisions, and the site was considered to have greater environmental concerns than the proposed ISEGS site (CH2M Hill 2007).

Site C alternative is located southeast of the proposed ISEGS site, bordering Interstate 15 on the north and west and Nipton Road (Highway 164) to the south; see **Figure 3.15**. It would be bordered by the Ivanpah Dry Lake to the east. It has similar characteristics to the ISEGS site, with an average elevation of between 2,950 and 2,600 feet and a similar slope. Given the proximity of the sites, it is reasonable to assume that they have similar habitat characteristics. The transmission interconnection would also be similar to that at the ISEGS site. Ivanpah Site C would border the Mojave National Preserve to the south.

The site would be located in a DWMA, established to protect denser populations of desert tortoise (CH2M Hill 2007). Longer interconnections with the Kern River gas transmission line and the SCE transmission line would be required due to the site's greater distance from these utilities.

Rationale for Elimination

This alternative is not considered further in this EIS because it would be located within a DWMA. It is likely that this type of project would be inconsistent with the basic policy objectives for the management of a DWMA, which include protection of the biological resources.

Environmental Impact Summary

Ivanpah Site C would result in the permanent loss of approximately 4,000 acres of desert habitat. Given the proximity of Ivanpah Site C and the proposed ISEGS site at Ivanpah Basin, the impacts on biological resources and sensitive species habitat would be about the same. Given that the Ivanpah Site C would be located in a Desert Wildlife Management Area, impacts to desert tortoise may be greater than at the proposed ISEGS site. Impacts to land use and recreation at the Ivanpah Site C would also be similar to impacts of the proposed ISEGS site due to its proximity to Ivanpah Dry Lake and recreational off-highway vehicle use. Ivanpah Site C would be located entirely on BLM land and would be within the CDCA and NEMO Planning Areas and may conflict with these agencies' plans.

Ivanpah Site C is immediately adjacent to the Ivanpah Dry Lake on the east side, which is used more frequently than the west side for large recreational events (Downing 2008). Ivanpah Site C borders the Mojave National Preserve, a National Park Service unit with high value for recreation and preservation of views. In addition, Ivanpah Site C borders both the I-15 and Nipton Road and would cause greater visual impacts to passing motorists than the proposed site.

Due to the proximity of the proposed ISEGS site and the Ivanpah Site C, many impacts of the Ivanpah Site C would be similar to those of the proposed site. However, Ivanpah Site C would be more visible from I-15 and Nipton Road. Also, because Ivanpah Site C is located in a Desert Wildlife Management Area, the potential for impacts to desert tortoise may be greater. Longer interconnections with the Kern River gas transmission line and the SCE transmission line would be required, with associated increased ground disturbance and visual impacts. The greater proximity to the Ivanpah Dry Lake could increase cultural resource impacts as more cultural artifacts may be present.

3.3.1.6 West of Clark Mountain Alternative

Description

At the request of the National Parks Conservation Association and National Park Service, a site west of Clark Mountain was considered as a means of reducing visual impacts to the Mojave National Preserve. Two broad valleys west of Clark Mountain offer slopes consistent with solar requirements: the Silurian Valley (north of Baker, which is used by the Army for desert warfare training based in the National Training Center at Fort Irwin) and the Shadow Valley immediately west of the Clark Mountain Range. The Silurian Valley is bisected by State Highway 127, which is a major access road for Death Valley National Park.

Although there is land west of Clark Mountain that fits the site selection criteria for a solar energy project, much of the land immediately west of the Clark Mountain Range in Shadow Valley is located in the Eastern Mojave Desert Tortoise Recovery Unit and within a Desert Wildlife Management Area and therefore, while it may meet the site selection criteria, it would not be feasible as an alternative to the ISEGS site. Further east of Shadow Valley, among the Shadow Mountains, the topography is such that a contiguous 400-MW solar thermal power plant would not have the suitable ground slope requirement and is therefore not feasible for solar energy projects. Suitable land for a solar project exists in the Silurian Valley; however, existing solar and wind applications have already requested use of this land. The solar and wind project applications in the area west of Clark Mountain pending before BLM are the following (BLM 2008b and BLM 2008c):

- Solar Investments VI LLC, solar trough technology (6,400 acres);
- FPL Energy LLC, parabolic trough technology (7,680 acres);
- Solar Investments Inc., parabolic trough technology (9,600 acres);
- Solar Investments XI LLC, parabolic trough technology (10,000 acres);
- Pacific Wind Development LLC (Iberdrola), wind turbines (6,623 acres).

West of the Silurian Valley is the Fort Irwin National Training Center, which is not considered to be available for a large solar project.

Rationale for Elimination

This alternative is not considered further in this EIS because it would be located within a DWMA. It is likely that this type of project would be inconsistent with the basic policy

objectives for the management of a DWMA, which include protection of the biological resources.

3.3.1.7 Ivanpah Playa Alternative

Description

Although not initially identified as a potential alternative by BLM, public comments on the DEIS recommended consideration of an alternative in which the proposed project would be located on Ivanpah Dry Lake. The objective of this alternative was to implement the development in a location which would avoid disturbance of biological resources such as plants and desert tortoises associated with the proposed project location.

Although placement of the facility on the Dry Lake bed would eliminate impacts to vegetation and tortoises, it would likely not be technically or economically feasible, and would also create other impacts. The Dry Lake bed does flood, sometimes more than once per year, and when it does, vehicles cannot drive on the Dry Lake bed surface. When it floods, it usually remains flooded for a period of weeks or months. The project location could potentially be diked to protect the facility against flooding, but this would likely be economically prohibitive, and would also not protect the facility against direct rainfall.

Placement of the facility on the Dry Lake bed would also eliminate the use of the Dry Lake bed for its current recreational uses. The Dry Lake bed is specifically designated, within the CDCA Plan, for nonmotorized open-space recreational activities. The Dry Lake bed is also specifically designated as closed to vehicle access in the CDCA Plan.

Rationale for Elimination

The Ivanpah Playa alternative would not be economically feasible, and would be inconsistent with current management objectives for non-motorized recreation on the Dry Lake bed, so it is not considered further in this EIS.

3.3.1.8 Other Site Alternatives Eliminated

The following alternatives were considered by the applicant, but were not retained for full analysis in their AFC; they are also not analyzed by BLM in this EIS as explained in **Table 3.7**.

Table 3.7
Alternatives Not Carried Forward for Further Analysis

Site	Reasons Eliminated
Carrizo Plain	Carrizo Plain was eliminated from consideration due to poor solarity and poor gas and water infrastructure. In addition, potential site control difficulties meant the site was not considered economically viable.
Harper Lake	Harper Lake was eliminated from consideration because gaining site control was considered to be time consuming and speculative.
Lucerne Lake	Lucerne Lake was eliminated from consideration because the site was too small and did not provide adequate site control; therefore, the site was not economically viable.
Rabbit Lake	Rabbit Lake was eliminated from consideration because the site was too small and did not provide adequate site control; therefore, the site was not economically viable.
Jean Lake	Jean Lake was eliminated from consideration because the site contained a pending application by a different applicant.
Ivanpah Site B	Ivanpah Site B was eliminated from consideration because the site contained a pending application with BLM by a different applicant.

Source: CH2M Hill 2007

3.3.2 Alternative Solar Generation Technologies

Alternative solar technologies were not the subject of the application received by the BLM. Although reasonable alternatives to the proposed action may include those that are practicable or feasible from a technical and economic standpoint, rather than simply desirable from the applicant's perspective, it is not within the FLPMA authority granted to BLM to direct a project applicant to the specific type of technology or system of energy development on the public lands. For BLM to dictate a project applicant's business model, and hence its technical or economic feasibility, is highly irregular. However, for NEPA purposes, these alternative technologies were considered but eliminated from full analysis as explained below.

Although alternative solar generation technologies would achieve most of the project objectives, each would have different environmental or feasibility concerns. The following solar generation technologies are considered in this analysis:

- parabolic trough technology
- Stirling dish technology
- linear Fresnel technology
- photovoltaic technology

Among the solar thermal technology alternatives, the linear Fresnel alternative has the potential for least impacts due to its more compact configuration (reducing ground disturbance); however, the technology is proprietary and is not available to other developers such as BrightSource. The distributed solar alternative would have fewer impacts than the proposed project because it would be located on already existing

buildings or on already disturbed land. However, achieving 400 MW of distributed solar PV or solar thermal would depend on additional policy support, manufacturing capacity, and lower cost than currently exists to provide the renewable energy required to meet the California Renewable Portfolio Standard requirements so additional technologies, like utility-scale solar thermal generation, are also necessary.

For each of these technologies, as well as BrightSource's power tower technology, there are current efforts to improve efficiency, reduce land use requirements, and otherwise reduce environmental impacts. The environmental evaluation is based on current information for each technology. While improvements to a single technology in the future may result in a reduction of impacts relative to the other technologies, those improvements cannot be predicted, or incorporated into the environmental analysis at this time.

3.3.2.1 Parabolic Trough Technology

Description

A parabolic trough system converts solar radiation to electricity by using sunlight to heat a fluid, such as oil, which is then used to generate steam. The plant consists of a large field of trough-shaped solar collectors arranged in parallel rows, normally aligned on a north-south horizontal axis. As illustrated in the photo below. Each parabolic trough collector has a linear parabolic-shaped reflector that focuses the sun's direct beam radiation on a linear receiver, also referred to as a heat collection element located at the focus of the parabola. Heat transfer fluid within the collector is heated to approximately 740°F as it circulates through the receiver and returns to a series of heat exchangers where the fluid is used to generate high-pressure steam. The superheated steam is then fed to a conventional reheat steam turbine/generator to produce electricity.

A solar trough power plant generally requires land with a grade of less than 1 percent. On average, 5 to 8 acres of land are required per MW of power generated. A parabolic trough power plant would include the following major elements.

- **Parabolic Trough Collectors**. The parabolic trough collectors rotate around the horizontal north/south axis to track the sun as it moves through the sky during the day. Reflectors, or mirrors, focus the sun's radiation on a linear receiver/heat collection element, which is located along the length of the collector.
- **Solar Boiler.** Solar boilers are designed differently than conventional gas-fired boilers in that they are fueled with hot oil instead of hot gases. This design is similar to any shell and tube heat exchanger in that the hot heat transfer fluid is circulated through tubes and the steam is produced on the shell side.
- **Heat Transfer Fluid Oil Heater**. Due to the high freezing temperature of the solar field's heat transfer fluid (54°F), to eliminate the problem of oil freezing, an oil heater would be installed and used to protect the system during the night hours and colder months.

Parabolic trough power plants are the most established type of large solar generator. They exist in several places, including the following examples:

- **Nevada SolarOne** (illustrated in **Figure 3.20**) near Boulder City, Nevada, has been in operation since June 2007. It cost of more than $260 million dollars and generates 64 MW. It is the largest concentrating solar power plant to be built in the last 17 years and is the third largest plant of its kind in the world (Nevada SolarOne 2008).
- **Sunray Energy, Inc. Solar Energy Generating System** is located in Daggett, adjacent to an abandoned power tower facility. It generates 44 MW.
- **Kramer Junction Solar Energy Generating System** is located about 30 miles west of Barstow. The solar energy generating system projects are a series of utility-scale solar thermal electric power plants, which were designed and developed in the mid-1980s by LUZ Industries. The facility can produce 165 MW at full capacity (Solel 2008).

Rationale for Elimination

While solar trough technology is a viable renewable technology and would likely reduce the footprint of the project, it would have substantially similar effects to those of the proposed project. Also, this technology is not within the area of expertise of the applicant, and therefore would not likely be technically or economically feasible for them to implement. Therefore, this alternative technology is eliminated from further consideration.

Environmental Impact Summary

Approximately 2,000 to 3,200 acres of land would be required for a 400-MW solar trough power plant, resulting in a permanent loss of natural desert habitat similar to the habitat loss created by the proposed solar tower technology.

If the solar trough technology were used at Ivanpah, somewhat more than 3,200 acres may be required because the proposed site is crossed by several desert washes. Parabolic troughs require a more level ground surface than power tower technology, because the troughs are connected by piping and must be level to allow flow of heated fluid. Therefore, the entire solar trough power plant would be graded to eliminate small-scale drainage features, removing all vegetation from the area. This results in a somewhat more severe effect on biological resources than the ISEGS project, which would not require grading over the entire site.

The size and height of the solar trough mirrors (each approximately 28 feet high) would cause visual impacts from Interstate 15 and Ivanpah Dry Lake. The plant would also be visible from the Primm Golf Course, immediately east of the ISEGS site and slightly elevated. While the solar trough technology would not have the approximately 459-foot-tall solar power towers, the number of solar troughs and the large acreage required would still introduce prominent and reflective structures.

Solar trough plants require water to generate the steam that powers the turbines. The technology uses a closed-loop circulation that requires some boiler make-up water to replace water lost in the system. Water is also required to wash the mirrors for both types of technologies. If wet cooling were used, the cooling towers would require approximately 600 AFY per 100 MW of capacity. Dry cooling would use substantially less water, approximately 18 AFY per 100 MW (NRDC 2008a).

Because of the extensive grading required for a solar trough plant, soil erosion could be more severe than that of the ISEGS project. The parabolic trough solar plant uses a heat transfer fluid to collect the heat from each parabolic trough collector and convey it to the solar boiler. The project would still require use of I-15 for commuting workers during both construction and operation.

The large land area needed for a solar trough power plant would likely be less than ISEGS, but more intensive in terms of ground disturbance. Because of the more intensive use of the land and the grading required to achieve a 1 percent grade, there could be more severe impacts to biological resources including vegetation, than would occur with the ISEGS facility. In addition, due to the large size of the power plant and the use of taller parabolic trough mirrors (approximately 28 feet high when at their maximum tilt) compared to the approximately 12 foot high heliostats for ISEGS, the visual impact could be greater, although the visual impact for ISEGS would be adverse and cannot be mitigated from some locations. Use of a heat transfer fluid as would be conveyed in miles of pipelines from the parabolic trough collectors to the solar boiler would create a potential for spill of a hazardous material into soil or water, which would not be present with ISEGS. Impacts to northbound I-15 traffic congestion on Friday afternoons and evenings would also not change, and would continue to contribute to an adverse cumulative impact during project construction and operation.

3.3.2.2 Stirling Dish Technology

Description

The Stirling dish technology converts thermal energy to electricity by using a mirror array to concentrate and focus sunlight on the receiver end of a Stirling engine. The curved dishes that focus the sun's energy are approximately 45 feet tall and occupy a maximum horizontal space of approximately 1,135 square feet (0.026 acres), with an anchored footprint of 12.5 square feet (assumed 4-foot diameter caisson). See **Figure 3.20** for an illustration. The internal side of the receiver heats hydrogen gas, which expands. The pressure created by the expanding gas drives a piston, crankshaft, and drive shaft. The drive shaft turns a small electricity generator. The entire energy conversion process takes place within a canister the size of an oil barrel. The generation process requires no water, and the engine does not produce emissions as no combustion takes place. Each concentrator consists of one Stirling engine mounted above one mirror array. Once installed, each concentrator requires very little maintenance aside from periodic washing of the mirrored surfaces of the dish.

In general, the Stirling system requires 7 to 9 acres of land per MW of power generated. Based on literature search, a 400-MW Stirling engine field would require from 2,800 acres to 3,600 acres of land. However, for two proposed solar thermal power plants using Stirling engine technology currently being considered by BLM and the Energy Commission, SES Solar 1 and 2, the land use per MW of installed capacity is about the same as ISEGS, and thus would require about the same footprint as ISEGS (See Efficiency Table 1 in **Appendix C - Power Plant Efficiency**).

Site preparation involves sinking a cement base with an embedded pedestal to support the dish (SES 2008a). Each Stirling dish generates 25 kW of power, so 16,000 dishes would be required to generate 400 MW. Each dish includes two major elements:

- **Solar Concentrator.** Large parabolic concentrators include 89 mirror facets attached to a frame by three point adjusting mounts (SES 2008a). They are designed in five subassembly units for ease of transport and installation on site. Two small motors are attached to the pedestal and programmed to swivel the dish on two axes, following the sun's progress across the sky during the day.
- **Power Conversion Unit.** The Stirling engine's cylinder block incorporates four sealed cylinder assemblies along with coolers, regenerators, and heater heads (SES 2008a). Concentrated solar energy heats up self-contained gas (hydrogen) in the power conversion unit, causing the gas to expand into the cylinders, moving the cylinders, and generating electricity. This cycle is repeated over and over as the engine runs at a steady rate of 1,800 rpm (SES 2008a). Power is generated by heat transfer from the concentrated solar rays to the working gas in the engine's heater head, which converts the heat energy into mechanical motion.

The generator of each unit in a utility-scale project is connected by underground transmission line to a small substation where the power can be transformed into a higher voltage for more efficient transmission across the grid.

<u>**Rationale for Elimination**</u>

Stirling dish technology has been eliminated from further consideration as an alternative technology because it would have substantially similar effects to those of the proposed project. Also, this technology is not within the area of expertise of the applicant, and therefore would not likely be technically or economically feasible for them to implement. Therefore, this alternative technology is eliminated from further consideration.

<u>**Environmental Impact Summary**</u>

The land area required for a 400-MW Stirling engine power plant is similar to that required for the proposed ISEGS project. However, it is not necessary to grade the entire parcel as only the 18-inch diameter pedestal of the Stirling engine requires level ground. It would still be necessary to grade permanent access roads between every two rows of Stirling engines due to the need for regular washing of the mirrors. This grading would cause removal of vegetation. Additionally, because the proposed Ivanpah site is crossed by several desert washes, the installation of 16,000 Stirling engines could require a larger total acreage of land, resulting in a greater loss of habitat.

Due to the size and height of the Stirling mirrors, impacts to visual resources would be similar or greater to those of ISEGS. While the Stirling engine technology would not require the approximately 459-foot-tall solar power towers, the 16,000 Stirling engines would introduce an industrial character and transformation of the site with the 45 foot tall engines. There would be less grading for the Stirling engine structures, but the numerous access roads required for cleaning the energy systems would create a high contrast between the disturbed area and its surroundings. The project would still require use of I-15 for commuting workers during both construction and operation.

The large area needed for a Stirling engine power plant would be comparable to the land requirement for the ISEGS power plant. Although grading requirements for the Stirling engines and solar concentrators are relatively small, like ISEGS, grading for access roads would be extensive because access roads are required for every other

row of Stirling engines (SES 2008b). For these reasons, recreation and land use, and biological resources impacts would be similar to those of the ISEGS facility. In addition, due to the extent of the facility and the height of each concentrator, adverse visual impacts would not be avoided or reduced by this alternative and may be greater considering that the 45-foot high solar concentrators would be more pronounced than the approximately 12-foot high heliostats. However, the Stirling technology does not require power towers or a turbine. Impacts to northbound I-15 traffic congestion on Friday afternoons and evenings would also not change, and would continue to contribute to adverse cumulative impacts during project construction and operation.

3.3.2.3 Linear Fresnel Technology

Description

A solar linear Fresnel power plant converts solar radiation to electricity by using flat moving mirrors to follow the path of the sun and reflect its heat on the fixed pipe receivers located about the mirrors. During daylight hours, the solar concentrators focus heat on the receivers to produce steam, which is collecting in a piping system and delivered to steam drums located in a solar filed and then transferred to steam drums in a power block (Carrizo 2007). The steam drums transferred to the power block will be used to turn steam turbine generators and produce electricity. The steam is then cooled, condensed into water, and recirculated back into the process.

In general, the linear Fresnel technology requires 4 – 5 acres of land per MW of power generated, which is about half the land required by the other solar technologies. A 400-MW solar linear Fresnel field would require approximately 1,600 – 2,000 acres of land.

Each row-segment is supported by large hoops that rotate independently on metal castors. Rotation of the reflectors would be driven by a small electrical pulse motor. Reflectors are stowed with the mirror aimed down at the ground during the night. The major components are:

- **CLFR Solar Concentrator.** A solar Fresnel power plant would use Ausra's CLFR technology which consists of slightly curved linear solar reflectors that concentrate solar energy on an elevated receiver structure. Reflectors measure 52.5 by 7.5 feet (Carrizo 2007). There are 24 reflectors in each row. A line is made up of 10 adjacent rows and operates as a unit, focusing on a single receiver (Carrizo 2007).
- **Receiver Structure.** The receiver structure is approximately 56 feet tall (Carrizo 2007). It would carry a row of specially coated steel pipes in an insulated cavity. The receiver would produce saturated steam at approximately 518°F from cool water pumped through the receiver pipes and heated (Carrizo 2007). The steam would drive turbines and produce electricity.

Rationale for Elimination

Linear Fresnel solar technology would have substantially similar effects to those of the proposed project. Also, this technology is not within the area of expertise of the applicant, and therefore would not likely be technically or economically feasible for them

to implement. Therefore, this alternative technology is eliminated from further consideration.

Environmental Impact Summary

Though the Fresnel solar technology would require less acreage per MW of electricity produced than the ISEGS power tower plant, the Fresnel technology would still require the removal of approximately 1,600 – 2,000 acres of desert habitat. The mirrors are placed close together, so grading of the entire 1,600 acres would likely be required. Also, because the proposed Ivanpah site location is crossed by several desert washes, the engineering of the Fresnel siting may require a larger acreage than would otherwise be expected.

The Fresnel receiver structure is approximately 56 feet high and is required for every 10 rows of mirrors. Additionally, steam drums about 58 feet tall would be required to collect the steam from the receiver structure. The steam turbine generators would be roughly 60 feet tall and the air-cooled condensers, 115 feet tall. Due to the height of the many project facilities, impacts to visual resources would be similar to those of the proposed ISEGS facility.

Linear Fresnel plants would require water to generate the steam that powers the turbines. The technology uses a closed-loop circulation that requires some make-up water to replace water lost in the system. Water would also be required to wash the mirrors. If wet cooling were used, the cooling towers would require approximately 600 acre feet per year per 100 MW. Dry cooling would use significantly less water, approximately 12.3 acre feet per year per 100 MW (NRDC 2008b). The project would still require use of I-15 for commuting workers during both construction and operation.

Although the linear Fresnel technology would require grading of the entire project site, the plant would require only 1,600 – 2,000 acres, about half the acreage required by the ISEGS project to generate the same amount of power. While visual and ground disturbance impacts would be reduced due to the smaller footprint, the ground disturbance would be more intense within the project boundaries and the visual impacts of the solar field could be more pronounced when comparing the 56-foot high receivers to the approximately 12-foot high heliostats for ISEGS. Impacts to northbound I-15 traffic congestion on Friday afternoons and evenings would also not change, and would continue to contribute to adverse cumulative impacts during project construction and operation.

3.3.2.4 Solar Photovoltaic Technology – Utility Scale

Description

A solar photovoltaic (PV) power generation facility would consist of PV panels that would absorb solar radiation and convert it directly to electricity. Major PV facilities have been suggested using two general technologies:

- Thin film installed on fixed metal racks, as proposed by First Solar (see **Figure 3.21**)
- Concentrating photovoltaics installed in elevated groups of panels that track the sun. These technologies are available from companies such as SunPower and

Amonix. SunPower's PowerTracker technology consists of a single-axis mechanism that rotates the PV panels to follow the sunlight. The Amonix technology allows tracking on two axes. See **Figure 3.21**.

Photovoltaics are used frequently in smaller scale, but have been used infrequently for larger scale power generation. Examples of existing larger PV facilities are:

- Nellis Air Force Base (Nevada): Over 72,000 solar panels, generating 14 MW of energy, were constructed between April and December 2007, by Sunpower Corp. on 140 acres of Nellis land (Whitney 2007).
- GreenVolts (Tracy, CA): GreenVolts is building a 2MW facility near the intersection of Interstates 580 and 205 to demonstrate the commercial viability of its concentrating photovoltaic technology. The facility is comprised of CarouSol devices which magnify the sun rays 625 times onto a composite solar cell (Nauman 2008).

Because PV technologies vary, the acreage required per MW of electricity produced from a large solar PV power plant is wide ranging and likely to change as technology continues to develop. The land requirement varies from approximately 3 acres per MW of capacity for crystalline silicon to more than 10 acres per MW produced for thin film and tracking technologies (NRDC 2008c). Therefore, a nominal 400-MW solar PV power plant would require between 1,600 and 4,000 acres.

Utility-scale solar PV installations require land with less than 3 percent slope. Solar photovoltaics do not require water for electricity generation. Some water may be required to wash the solar panels to maintain efficiency, approximately 2-10 acre feet per year of water may be required for a 100 MW utility solar PV installation or 8 to 40 acre feet for a 400 MW installation (NRDC 2008c). The SunPower-CA Valley Solar Ranch states that the facility would use approximately 11.6 AFY for a 250 MW PV facility, which would equal less than 20 AFY for a 400 MW PV facility (SLO 2009).

Solar PV arrays and inverters would be approximately 15 to 20 feet high; however, some components of the solar PV facility, such as collector power lines or a transmission interconnection may be significantly taller (SLO 2009).

As with any large solar facility, additional operational components may be required. The SunPower-California Valley Solar Ranch would require such operational components as electrical equipment, collector power lines, access roads, a substation, an operation and maintenance building, and water tanks, among others (SLO 2009).

Rationale for Elimination

While utility scale solar PV technology is a viable renewable technology it would have substantially similar effects to those of the proposed project. Also, this technology is not within the area of expertise of the applicant, and therefore would not likely be technically or economically feasible for them to implement. Therefore, this alternative technology is eliminated from further consideration.

Environmental Impact Summary

A utility scale solar PV facility would create a number of adverse impacts similar to those created by the ISEGS facility.

If utility scale solar PV technology were built at the Ivanpah Valley, approximately 1,600 to over 4,000 acres may be required, depending on the technology. Because the proposed site is crossed by several desert washes, it is likely that the acreage required for a solar PV facility would exceed that of ISEGS, in order to site the solar PV arrays away from substantial washes. Additionally, solar PV technology requires ground surface with less than 3 percent slope. Although the regional-scale slope within the proposed project area (from the mountains to the Dry Lake bed) is lower than 3 percent, the presence of numerous incised drainages channels, on a small-scale, frequently exceeds 3 percent. Therefore, it is likely that areas with a slope greater than 3 percent would be entirely graded, removing all vegetation from these locations. This results in a somewhat more severe effect on biological resources than the ISEGS project, which would not require grading over the entire site.

The size and height of the solar PV arrays would likely be visible from nearby regions, such as Interstate 15 and the Ivanpah Dry Lake due to the large size of the solar PV facility. The facility would also be visible from the Primm Golf Course, immediately east of the ISEGS site and slightly elevated. The large number of solar PV arrays, access roads, and interconnection power lines required for a 400 MW solar facility would introduce prominent industrial features; however, the solar PV technology would not introduce components as tall as the approximately 459-foot-tall solar power towers or the cooling towers as with the solar power tower technology. Additionally, because most PV panels are black to absorb sun, rather than mirrored to reflect it, glare would not be created as with the mirrors required for the power tower, Fresnel, and trough technologies. Although the visual impacts would not be as noticeable as those of the proposed project, they would still be substantial.

Because the solar PV technology does not require any water for cooling or steam generation, the technology uses less water than solar concentrating technologies. Water would be required for washing the solar PV arrays. Approximately 20 AFY would be required instead of the approximately 78 AFY for the solar power tower technology (SLO 2009).

More extensive grading would be required for a solar PV facility than a solar power tower facility. Because solar PV facilities require land with only 3 percent slope and the solar panels are grouped more densely together, it is likely that more grading would be required for a solar PV facility than for a solar power tower facility to establish man-made stormwater conveyance channels. This would not achieve the low-impact development approach as is proposed with ISEGS that would minimize grading and would largely avoid disturbance to the ephemeral drainages. Additionally, many miles of permanent access roads would be required for washing and maintenance of the solar panels. The extensive grading would likely create greater erosion concerns than those of the ISEGS project. The project would still require use of I-15 for commuting workers during both construction and operation.

The large land area required for PV development would result in similar impacts to recreation, land use, biological resources, and likely greater impacts to soil and water resources as those of the ISEGS facility. In addition, the large facility would be highly visible and would still have unavoidable adverse visual impacts. Impacts to northbound I-15 traffic congestion on Friday afternoons and evenings would also not change, and

would continue to contribute to adverse cumulative impacts during project construction and operation.

3.3.2.5 Distributed Solar Technology

Description

Distributed solar generation is generally considered to use PV technology, but at slightly larger scales, distributed solar can also be implemented using solar thermal technologies.

Rooftop Solar Systems

A distributed solar PV alternative would consist of PV panels that would absorb solar radiation and convert it directly to electricity. The PV panels could be installed on residential, commercial, or industrial building rooftops or in other disturbed areas.

California currently has 441 MW of distributed solar PV systems which cover over 40 million square feet (CPUC 2008a). During 2008, 158 MW of distributed solar PV was installed in California, doubling the amount installed in 2007 (78 MW) (CPUC 2009). While small distributed solar PV systems are relatively common in California, large distributed solar PV installations are less so. Examples of proposed rooftop PV systems to attain large amounts of energy are the following:

- Southern California Edison (Fontana, CA): Over 33,000 solar panels were attached to a 600,000-square-foot commercial roof, generating 2 MW of energy, using thin film PV technology provided by First Solar; this is the first installment of a planned installation of 3.5 million PV panels that would generate 250 MW of capacity (SCE 2008).
- San Diego Gas & Electric (San Diego, CA): Solar Energy Project is designed to install up to 80 MW of solar PV which would include parking structures and tracking systems on open land (SDG&E 2008).
- Pacific Gas & Electric (San Francisco, CA): PG&E launched a five-year program to develop 500 MW of solar PV power. The program would consist of 250 MW of utility-owned PV generation and an additional 250 MW to be built and operated by independent developers under a streamlined regulatory process. PG&E's program targets mid-sized projects, between 1 to 20 MWs, mounted on the ground or rooftop within its service area (PG&E 2009).
- City of San Jose (San Jose, CA): The City of San Jose is considering the development and implementation of 50 MW of renewable solar energy on city facilities and/or land (San Jose 2009). San Jose's Green Vision lays out a goal of achieving 100% of the city's electricity from renewable energy by 2020; as part of this project, the City issued a solicitation for the installation of 50 MW of energy on City facilities and/or land in June of 2009 (San Jose 2009). The City anticipates that City facilities with appropriate solar access including parking lots, garages, lands and landfills would be eligible for solar installation.
- Like utility-scale PV systems, the acreage of rooftops or other infrastructure required per MW of electricity produced is wide ranging. As stated above, California has approximately 40 million square feet (approximately 920 acres) of

distributed solar PV accounting for 441 MW installed (CPUC 2008a). However, based on SCE's use of 600,000-square-feet for 2 MW of energy, 120 million square feet (approximately 2,750 acres) would be required for 400 MW.

- Most rooftop PV systems in California are crystalline systems, and result in approximately 15 percent of sunlight converted to energy (SB 2009). The newer technology is thin film, which converts approximately 5 to 10 percent of sunlight to energy.
- San Bernardino County is estimated to have the technical potential for over 2,000 MW of distributed solar PV (CEC 2007a). However, the location of the distributed solar PV would impact the capacity factor of the distributed solar PV.[2] Capacity factor depends on a number of factors including the insolation[3] of the site. Because a distributed solar PV alternative would be located throughout the state of California, the insolation at some of these locations may be less than in the Mojave Desert. The RETI assumed a capacity factor of approximately 30 percent for solar thermal technologies and tracking solar photovoltaic and approximately 20 percent capacity factor for rooftop solar PV which is assumed to be non-tracking (B&V 2008; CEC 2009a).

Distributed Solar Thermal Systems

Solar thermal technology, specifically Concentrated Solar Power (CSP) technology, has also been adapted for use at distributed locations. In August 2009, eSolar began operations of a new distributed solar power tower technology. This technology uses small, flat mirrors which track the sun and reflect the heat to tower-mounted receivers that boil water to create superheated steam (eSolar 2009). An example of the eSolar system is the Sierra SunTower, located in Lancaster, CA, which will produce 5 MW of energy on 20 acres of land for SCE (eSolar 2009). Each eSolar module locates one tower, one thermal receiver, and 12,000 mirrors on ten acres of land and produces 2.5 MW of power. Additionally, eSolar has developed a larger module, a 46 MW CSP plant that would include sixteen towers, a turbine generator set, and a steam condenser which would be located on approximately 160 acres (eSolar 2009).

An additional example of a distributed solar trough power plant technology is the Andasol 1 power plant in Spain. Andasol 1, generating 50 MW of power, went online in November 2008 (Solar Millennium 2008). The Andasol plant includes thermal storage systems which absorb a portion of the heat produced in the solar field during the day and can run the turbines for approximately 7.5 hours at full load, regardless of the solar conditions at the time (Solar Millennium 2008). The Andasol 1 solar field is approximately 510,000 square meters or 127 acres (Solar Millennium 2008). This does not include the ancillary facilities.

Both these technologies have been implemented recently and are described here as an example of the evolving distributed solar technologies.

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[2] The capacity factor of a power plant is a percentage that tells how much of a power plant's capacity is used over time (CEC 2008a)

[3] Insolation is the total amount of solar radiation striking a surface exposed to the sky (CEC 2008a).

Rationale for Elimination

The rate of PV manufacturing and installation is expected to continue to grow very quickly. However, given that there is currently a total of about 500 MW of distributed solar PV in California, the addition of another 400 MW to eliminate the need for the ISEGS project cannot be guaranteed. This would require an even more aggressive deployment of PV at more than double the historic rate of solar PV implementation than the California Solar Initiative program currently employs. Challenges to an accelerated implementation of distributed solar PV are discussed below.

- **RETI Consideration of Subsidies, Tariffs, Cost, and Manufacturing.** The RETI Discussion Draft Paper *California's Renewable Energy Goals – Assessing the Need for Additional Transmission Facilities* published with the RETI Final Phase 2A Report (September 2009), addresses the likelihood of a scenario of sufficient distributed solar PV to remove the need for utility scale renewable development. This discussion paper identified the factors likely to influence the pace of large scale deployment of distributed solar PV: subsidies, feed-in tariffs, manufacturing and installation cost, and manufacturing scale-up.
- **Cost.** The 2009 Integrated Energy Policy Report (IEPR) states that solar PV technology has shown dramatic cost reductions since 2007, and is expected to show the most improvement of all the technologies evaluated in the 2009 IEPR model, bringing its capital cost within range of that of natural gas-fired combined cycle units. However, the CPUC *33% Renewables Portfolio Standard Implementation Analysis Preliminary Results* considered a number of cases to achieve a 33 percent RPS standard. The results of this study state that the cost of a high distributed generation case is significantly higher than the other 33 percent RPS alternative cases. The study explains that this is due to the heavy reliance on solar PV resources which are more expensive than wind and central station solar.
- **Tariffs**. The IEPR discusses the need to adjust feed-in tariffs to keep downward pressure on costs. Feed-in tariffs should be developed based on the size and type of renewable resources, given that the cost of generating energy from a 100-MW wind farm is less than the cost of generating to ensure a good mix of new renewable energy projects. According to the report, differentiating feed-in tariffs by type and size can ensure a good mix of new renewable energy projects and avoid paying too much for some technologies and too little for others.
- **Limited Installations**. There are few existing large scale distributed solar projects. In the spring of 2008, SCE proposed 250 to 500 MW of rooftop solar PV to be installed in five years. As of January 2010, SCE had installed only 3 MW. As the 2009 IEPR points out, the potential for distributed resources remains largely untapped and integrating large amounts of distributed renewable generation on distribution systems throughout the State presents challenges.
- **Electric Distribution System**. The State's electric distribution systems are not designed to easily accommodate large quantities of randomly installed distributed generation resources at customer sites. Accomplishing this objective efficiently and cost-effectively will require the development of a new transparent distribution planning framework.

The 2009 IEPR makes a number of recommendations to support the integration of distributed generation into the California grid, expand feed-in tariffs, and support the efforts to achieve the RPS goals as a whole. It also recommends supporting new renewable facilities and the necessary transmission corridors and lines to access the facilities.

In testimony filed by the Center for Biological Diversity in the ISEGS proceeding [Docket No. 07-AFC-5], Bill Powers stated that the technology and manufacturing capacity is available to develop 400 MW of distributed PV, and that he believed that the distribution system would be able to accommodate the additional distributed generation. He presented numerous examples of California utility programs that have committed to development of hundreds of megawatts of additional distributed solar PV.

These considerations indicate that implementation of distributed solar technology at the scale needed is remote and speculative, and would likely be technically and economically infeasible. As a result, this technology is eliminated from detailed analysis.

Environmental Impact Summary

Installations of 400 MW distributed solar PV would require between 40 to 120 million square feet of solar panels to be installed on urban rooftops, parking lots, or other developed areas, as compared to approximately 177 million square feet for the proposed project. Distributed solar PV is assumed to be located on already existing structures or disturbed areas so little to no new ground disturbance would be required and there would be few associated biological impacts.

Minimal grading or new access roads would be required and relatively minimal maintenance and washing of the solar panels would be required. As such, it is unlikely that the rooftop solar PV alternative would create erosion impacts. Relatively large amounts of water would be required to wash the solar panels, especially with larger commercial rooftop solar installations; however, the commercial facilities would likely already be equipped with drainage systems. Therefore, the wash water would not contribute to runoff or to erosion.

Because most PV panels are black to absorb sun, rather than mirrored to reflect it, glare would not create visual impacts as with the power tower, Fresnel, and trough technologies. Additionally, the distributed solar PV alternative would not require the additional operational components, such as dry-cooling towers, substations, transmission interconnection, maintenance and operation facilities with corresponding visual impacts. Solar PV panels would be visible to passing residents and may be viewed by a larger number of people.

3.3.3 Other Alternative Renewable Technologies

Non-solar renewable generation technologies were considered as potential alternatives to the proposed project. The following renewable generation technologies were considered in this analysis:

- wind energy
- geothermal energy
- biomass energy

- tidal energy
- wave energy

The non-solar renewable technologies alternatives (wind, geothermal, biomass, tidal, wave) would likely be infeasible at the scale of the ISEGS project, are generally restricted to specific locations, and might not avoid or minimize adverse effects of the proposed action. In addition, many of these forms of alternative renewable energy are not within the jurisdiction of the BLM. Tidal and wave energy are not found on public land managed by the BLM, are remote and speculation forms of renewables, are ineffective in responding to the purpose and need, and are inconsistent with the basic policy objectives for management of the desert. Geothermal energy is an alternative energy source that can be approved on the public lands under BLM management, but these types of projects require a specific and particularized resource. The project must be located where the resource is found. The Ivanpah Valley has no geothermal resources. In addition, the project applicant has not applied for tidal, wave, geothermal, biomass, or wind energy grant. Specifically, wind energy that would be viable at some locations in the Mojave Desert could create significant impacts to biological, visual, cultural, and water and soils resources.

3.3.3.1 Wind Energy

Description

Wind carries kinetic energy that can be utilized to spin the blades of a wind turbine rotor and an electrical generator, which then feed alternating current (AC) into the utility grid. Most state-of-the-art wind turbines operating today convert 35 to 40 percent of the wind's kinetic energy into electricity. A single 1.5-MW turbine operating at a 40 percent capacity factor generates 2,100 MWh annually. Modern wind turbines represent viable renewable alternatives to large solar energy projects within the region as exemplified by the number of wind projects applications pending to BLM within both California and Nevada. The BLM has received approximately 96 applications for wind projects within the California Desert District as of November 2008, for use of over 750,000 acres of land (BLM 2008b).

Wind turbines currently being manufactured have power ratings ranging from 250 watts to 5 MW, and units larger than 7 MW in capacity are now under development. The average capacity of wind turbines installed in the United States in 2007 was 1.65 MW (EERE 2008).

The perception of wind as an emerging energy source reached a peak in the early 1980s, when wind turbine generators to convert wind power into electricity were being installed in California at a rate of nearly 2,000 per year. Progress slowed a few years later, however, as start-up tax subsidies disappeared and experience demonstrated some deficiencies in design. At the present time, technological progress again has caught up, contributing lower cost, greater reliability, and reason for genuine optimism for the future.

The technology is now well developed and can be used to generate significant amounts of power. There are now approximately 2,490 MW of wind being generated in California.

Rationale for Elimination

Because the scale of current solar, wind, and other renewable energy facilities is on the order of 100 to 500 MW, BLM is considering and processing multiple renewable energy applications, including wind applications, in order to achieve the objectives of the EPAct, which encourages the Department of the Interior (BLM's parent agency) to approve at least 10,000 MW of renewable energy on public lands by 2015. Although wind energy is clearly a reasonable and feasible renewable technology, approval of wind energy projects alone is not expected to be sufficient to achieve the EPAct objectives. Also, although the impacts of wind energy are different from those of solar, they can still be adverse, and implementation of wind power facilities is limited by both technical and environmental factors. Therefore, wind energy is not retained for further analysis as an alternative to the proposed project.

Environmental Impact Summary

Wind turbines can create environmental impacts, as summarized below:

- Wind energy requires between 5 and 17 acres per MW of energy created. As such a nominal 400-MW power plant would require between 2,000 and 6,800 acres. However, wind turbine "footprints" typically use only 5 percent of the total area, or approximately 100 to 340 acres for a 400-MW power plant.
- Erosion can be a concern in certain habitats such as the desert or mountain ridgelines. Standard engineering practices can be used to reduce erosion potential.
- Birds collide with wind turbines. Avian deaths, particularly raptors, are a significant concern depending on raptor use of the area.
- Wind energy can negatively impact birds and other wildlife by fragmenting habitat, both through installation and operation of wind turbines themselves and through the roads and power lines that are required.
- Bats collide with wind turbines. The extent of bat mortality depends on turbine placement and bat flight patterns.
- Visual impacts of wind turbines can be adverse, and installation in scenic and high traffic areas can result in strong local opposition. Other impressions of wind turbines are that they are attractive and represent clean energy.

Approximately 2,000 to 6,800 acres of land would be required for a 400-MW wind electricity power plant. While wind plants would not necessarily impact the same types of wildlife and vegetation as the ISEGS solar power tower plant, the acreage necessary for a 400-MW wind plant would still cause significant habitat loss in addition to potentially adverse impacts from habitat fragmentation and bird and bat mortality.

Wind turbines are often over 400 feet high for 2-MW turbines. As such, any wind energy project would be highly visible, which is of special concern in scenic areas.

3.3.3.2 Geothermal Energy

Description

Geothermal technologies use steam or high-temperature water obtained from naturally occurring geothermal reservoirs to drive steam turbine/generators. There are vapor dominated resources (dry, super-heated steam) and liquid-dominated resources where various techniques are utilized to extract energy from the high-temperature water.

Geothermal plants account for approximately 5 percent of California's power and range in size from under 1 MW to 110 MW. Geothermal plants typically operate as baseload facilities and require 0.2 to 0.5 acre per MW, so a 400-MW facility would require up to 200 acres. California is the largest geothermal power producer in the United States, with about 1,800 installed capacity in 2007, 13,000 gigawatt hours of electricity were produced in California (CEC 2008b). Geothermal plants provide highly reliable baseload power, with capacity factors from 90 to 98 percent.

Geothermal plants must be built near geothermal reservoir sites because steam and hot water cannot be transported long distances without significant thermal energy loss. Geothermal power plants are operating in the following California counties: Lake, Sonoma, Imperial, Inyo, Mono, and Lassen.

Rationale for Elimination

Geothermal generation is a commercially available technology and is important for California's renewable energy future because it provides baseload power. However, it is limited to areas with geologic conditions resulting in high subsurface temperatures. Even in areas where such conditions are present, there have been concerns about the reliability and corrosiveness of the steam supply. Additionally, while the technology is available, there are not enough geothermal resources to meet BLM's renewable energy approval goals, so additional technologies, like solar thermal generation, would also be required. Therefore, geothermal energy is not retained for further analysis as an alternative to the proposed project.

Environmental Impact Summary

Concerns regarding geothermal power plants include land use, water use, visibility, and hazardous materials, specifically gaseous emission. Geothermal power projects use less land than almost any other energy source, typically from about 0.2 to 0.5 acres per MW; however, geothermal plants must be built where the resource is since the steam cannot be piped long distances without significant heat loss. This results in a highly secure and predictable fuel supply and some inflexibility in siting. It may also result in a long interconnection requirement to reach a transmission system.

Drilling and operation of geothermal wells may also potentially degrade local groundwater aquifers. Geothermal wells are typically cased and cemented in a manner that precludes contamination of aquifers. Hot water and steam can only flow into the bottom of a geothermal well, significantly below cold water aquifers, and are confined within one to three layers of casing cemented almost all the way down the well. If there were a natural connection (or one created by drilling) between the reservoir and a cold water aquifer, it could destroy the commercial viability of the geothermal reservoir.

Operators avoid inflow of cold waters into a geothermal reservoir, or vice versa, both to comply with regulatory protections of groundwater aquifers and to protect the geothermal reservoir.

Geothermal plants can cause visual impacts; however, this can be reduced by careful siting of the power plant, using the natural screening of topography and trees, by painting facilities to blend with the surroundings and by locating them away from sensitive viewsheds. Very efficient water-cooled cooling towers can be designed so that vapor plumes from cooling towers are barely visible except on very cold, clear days.

Geothermal plant can also produce waste and byproducts that can have adverse impacts. The most significant and potentially harmful gas generally encountered in geothermal systems is hydrogen sulfide (H_2S), which, at concentrations higher than 30 parts per million (ppm), is a toxic substance (CEC 2003). It can cause a variety of problems including dizziness, vomiting, and eventually death if one is exposed for long periods of time. In stronger concentrations above 100 ppm, H_2S can be fatal. H_2S is heavier than air and can accumulate in low-lying areas (equipment pits, ravines, and other depressions) and become concentrated over time.

H_2S releases could potentially be of concern during drilling, well testing, and plant start-up and shut-down operations, although recent technology improvements in atmospheric separators can significantly decrease emissions and noise during these operations. H_2S is now often abated at geothermal power plants, resulting in a conversion of close to 100 percent of the H_2S into elemental sulfur (GEA 2007). Since 1976, H_2S emissions have decreased from 1,900 pounds per hour to 200 pounds per hour despite an increase in geothermal power production from 500 MW to 2,000 MW (GEA 2007).

3.3.3.3 Biomass Energy

Description

Electricity can be generated by burning organic fuels in a boiler to produce steam, which then turns a turbine; this is biomass generation. Biomass can also be converted into a fuel gas such as methane and burned to generate power. Wood is the most commonly used biomass for power generation. Major biomass fuels include forestry and mill wastes, agricultural field crop and food processing wastes, and construction and urban wood wastes. Several techniques are used to convert these fuels to electricity, including direct combustion, gasification, and anaerobic fermentation. Biomass facilities do not require the extensive amount of land required by the other renewable energy sources discussed, but they generate much smaller amounts of electricity.

Currently, nearly 19 percent of the state's renewable electricity derives from biomass and waste-to-energy sources (CEC 2007c). Most biomass plant capacities are in the 3- to 10-MW range and typically operate as baseload capacity. The average size of a sales generation biomass plant is 21 MW. Unlike other renewables, the locational flexibility of biomass facilities would reduce the need for significant transmission investments. Solid fuel biomass (555 MW) makes up about 1.75 percent of the state's electricity, and landfill gas generation (260 MW) makes up about 0.75 percent. Existing landfills not now producing electricity from gas could add a maximum of about 170 MW of new generation capacity.

Rationale for Elimination

Most biomass facilities produce only small amounts of electricity (in the range of 3 to 10 MW) and so could not meet the applicant's objectives, nor could they contribute substantially to BLM's renewable energy objectives under EPAct. In addition, implementation of biomass facilities in southern California may be limited by the available of fuel (which requires water), and by air quality considerations. Therefore, this technology is not considered as an alternative to the proposed project.

Environmental Impact Summary

Generally, small amounts of land are required for biomass power facilities; however, a biomass facility should be sited near a relatively large source of biomass in order to minimize the cost of bringing the biomass waste to the facility.

Operational noise impacts may be a concern, originating from truck engines as a result hauling operations coming from and going to the facility repeatedly on a daily basis. Other operations of the biomass facilities, while internal to the main structure, can result in increased noise due to the material grinding equipment.

The emissions due to biomass fuel-fired power plant operation are generally unavoidable. Direct impacts of criteria pollutants could cause or contribute to a violation of the ambient air quality standards. Adverse impacts can potentially occur for PM10 and ozone because emissions of particulate matter and precursors and ozone precursors would contribute to existing violations of the PM10 and ozone standards. Biomass/biogas facility emissions could also adversely affect visibility and vegetation in federal Class I areas or state wilderness areas, which would deteriorate air quality related values in the wilderness areas. Toxic air contaminants from routine operation would also cause health risks that could locally adversely affect sensitive receptors.

3.3.3.4 Tidal Energy

Description

The oldest technology to harness tidal power for the generation of electricity involves building a dam, known as a *barrage*, across a bay or estuary that has large differences in elevation between high and low tides. Water retained behind a dam at high tide generates a power head sufficient to generate electricity as the tide ebbs and water released from within the dam turns conventional turbines.

Certain coastal regions experience higher tides than others. This is a result of the amplification of tides caused by local geographical features such as bays and inlets. In order to produce practical amounts of power for tidal barrages, a difference between high and low tides of at least 5 meters is required. There are about 40 sites around the world with this magnitude of tidal range. The higher the tides, the more electricity can be generated from a given site and the lower the cost of electricity produced. Worldwide, existing power plants include a 240-MW plant in France, a 20-MW plant in Nova Scotia, and a 0.5-MW plant in Russia (EPRI 2006a).

Tidal Fences

Tidal fences are effectively barrages that completely block a channel. If deployed across the mouth of an estuary, they can be very environmentally destructive. However, in the 1990s, their deployment in channels between small islands or in straights between the mainland and islands has increasingly been considered a viable option for generation of large amounts of electricity.

The advantage of a tidal fence is that all the electrical equipment (generators and transformers) can be kept high above the water. Also, by decreasing the cross-section of the channel, current velocity through the turbines is significantly increased.

The first large-scale commercial fences are likely to be built in Southeast Asia. The most advanced plan is a scheme for a fence across the Dalupiri Passage between the islands of Dalupiri and Samar in the Philippines, agreed upon by the Philippine government and Energy Engineering Company of Vancouver, Canada in late 1997. The site, on the south side of the San Bernardino Strait, is approximately 41 meters deep (with a relatively flat bottom) and has a peak tidal current of about 8 knots. As a result, the fence is expected to generate up to 2,200 MW of peak power (with a base daily average of 1,100 MW) (Osborne 2000).

Tidal Turbines

Tidal turbines are the chief competition to the tidal fence. Looking like an underwater wind turbine, they offer a number of advantages over the tidal fence. They are less disruptive to wildlife, allow small boats to continue to use the area, and have much lower material requirements than the fence.

Tidal turbines function well where coastal currents run at 2 to 2.5 meters per second (slower currents tend to be uneconomic while larger ones stress the equipment). Such currents provide an energy density four times greater than air, meaning that a 15-meter-diameter turbine will generate as much energy as a 60-meter-diameter windmill. In addition, tidal currents are both predictable and reliable, a feature which gives them an advantage over both wind and solar systems. The tidal turbine also offers significant environmental advantages over wind and solar systems; the majority of the assembly is hidden below the waterline, and all cabling is along the sea bed.

There are many sites around the world where tidal turbines could be effectively installed. The ideal site is close to shore (within 1 kilometer) in water depths of about 20 to 30 meters. In April 2007, the first major tidal-power project was installed in the United States off New York City's Roosevelt Island (Fairley 2007). Turbines such as those used in New York City use in-flow turbines, thereby lessening the environmental impacts. A study conducted in 2006, *System Level Design, Performance, Cost and Economic Assessment – San Francisco Tidal In-Stream Power Plant*, concluded that a tidal plant located under the Golden Gate Bridge could create approximately 35 MW of power with no significant impacts to the environment and recommended further research and development into both ocean energy technology and a pilot project in San Francisco (EPRI 2006b).

Rationale for Elimination

Tidal fence technology is a commercially available technology, but it is limited to areas that are adjacent to a body of water with a large difference between high and low tides. In-flow tidal turbines are a relatively new technology that is unproven at the scale that would be required to replace the proposed project, making implementation speculative. Therefore, it is not further considered as an alternative to the proposed project.

Environmental Impact Summary

Tidal technologies, especially tidal fences, have the potential to cause adverse biological impacts, especially to marine species and habitats. Fish could be caught in the unit's fins by the sudden drop in pressure near the unit. The passageways, more than 15 feet high and probably sitting on the bay floor, could squeeze out marine life that lives there or alter the tidal flow, sediment build-up, and the ecosystem in general. Even the in-flow turbines can have environmental impacts on marine systems. The in-flow turbines off New York City must undergo environmental monitoring for 18 months to ensure the turbines will not create environmental impacts to the river's marine wildlife. Also, depending on the location of the tidal technology, commercial shipping could be disrupted during construction.

The reduced tidal range (difference between high and low water levels) resulting from tidal energy generation can destroy inter-tidal habitat used by wading birds. Sediment trapped behind the barrage could also reduce the volume of the estuary over time.

3.3.3.5 Wave Energy

Description

Wave power technologies have been around for nearly 30 years. Setbacks and a general lack of confidence have contributed to slow progress towards proven devices that would have a good probability of becoming commercial sources of electrical power.

The highest energy waves are concentrated off the western coasts in the 40^{o} to 60^{o} latitude range north and south. The power in the wave fronts varies in these areas between 30 and 70 kilowatts per meter (kW/m) with peaks to 100 kW/m in the Atlantic southwest of Ireland, the Southern Ocean and off Cape Horn. Many wave energy devices are still in the research and development stage and would require large amounts of capital to get started. Additional costs from permitting and environmental assessments also make wave energy problematic (WEC 2007). Nonetheless, wave energy is likely to increase in use within the next 5 to 10 years.

The total power of waves breaking on the world's coastlines is estimated at 2 to 3 million megawatts. In favorable locations, wave energy density can average 65 MW per mile of coastline. Three approaches to capturing wave energy are:

- **Floats or Pitching Devices.** These devices generate electricity from the bobbing or pitching action of a floating object. The object can be mounted to a floating raft or to a device fixed on the ocean floor.
- **Oscillating Water Columns.** These devices generate electricity from the wave-driven rise and fall of water in a cylindrical shaft. The rising and falling water

column drives air into and out of the top of the shaft, powering an air-driven turbine.

- **Wave Surge or Focusing Devices.** These shoreline devices, also called "tapered channel" or "tapchan" systems, rely on a shore-mounted structure to channel and concentrate the waves, driving them into an elevated reservoir. Water flow out of this reservoir is used to generate electricity, using standard hydropower technologies.

In December 2007, PG&E signed a power purchase agreement with Finavera Renewables, which had planned to operate a wave farm approximately 2.5 miles off the coast of Eureka, California. The agreement was for 2 MW of power beginning in 2012. On October 16, 2008, the California Public Utilities Commission rejected PG&E's request for approval of a renewable resource procurement contract with Finavery Renewables because, among other reasons, the CPUC concluded the project had not been shown to be viable. As stated in the decision, there is significant uncertainty surrounding wave technology and the wave energy industry is at a beginning stage (CPUC 2008b). The CPUC did authorize up to $4.8 million for PG&E to undertake its WaveConnect project in D.09-01-036. WaveConnect is designed to document the feasibility of a facility that converts wave energy into electricity by using wave energy conversion (WEC) devices in the open ocean adjacent to PG&E's service territory.

Rationale for Elimination

Wave energy is new and may not be technologically feasible. Additionally, wave power must be located where waves are consistently strong; even then, the production of power depends on the size of waves, which result in large differences in the amount of energy produced. Wave technology is not considered an alternative to the ISEGS project because is an unproven technology at the scale that would be required to replace the proposed project.

Environmental Impact Summary

The environmental impacts of wave power have yet to be fully analyzed. A recent study published by the U.S. Department of Commerce and National Oceanic and Atmospheric Administration listed a number of potentially adverse environmental impacts created by wave power (Boehlert 2008). These include (Boehlert 2008):

- Significant reduction to waves with possible effects to beaches (e.g. changes to sediment transport processes).
- The use of buoys may have positive effects on forage fish species, which in turn could attract larger predators. Structures need to reduce potential entanglement of larger predators, especially marine turtle species.
- Modifications to water circulation and currents may result in changes to larval distribution and sediment transport.
- Wave energy development may affect community structures for fish and fisheries.
- Lighting and above-water structures may result in marine bird attraction and collisions and may alter food webs and beach processes.

- A diversity of concerns would arise regarding marine mammals including entanglement issues.
- Energy-absorbing structures may affect numerous receptors and should avoid sensitive habitats.
- Chemicals used in the process must be addressed both for spills and for a continuous release such as in fouling paints.
- New hard structures and lighting may break loose and increase debris accumulation.
- Impacts on fish and marine mammals caused by noise coming from the buoys should be understood and mitigated.
- Electromagnetic effects may affect feeding or orientation and should be better understood.
- Impact thresholds need to be established. As projects scale up in location or implementation, new risks may become evident.

3.3.4 Alternative Methods of Generating or Conserving Electricity

Nonrenewable generation technologies that require use of natural gas, coal, or nuclear energy would not achieve the key project objective for ISEGS: to safely and economically construct and operate a nominal 400-megawatt, renewable power generating facility in California capable of selling competitively priced renewable energy consistent with the needs of California utilities.

While these generation technologies would not achieve this key objective, they are presented here in brief for the benefit of the public and decision makers. Conservation and demand-side management is also briefly addressed in this section.

The following topics are considered in this analysis:

- natural gas
- coal
- nuclear energy
- conservation and demand-side management

Of the nonrenewable generation alternatives (natural gas, coal, and nuclear), only the natural gas-fired power plants would be viable alternatives within California. However, gas-fired plants would fail to meet a major project objective: to construct and operate a renewable power generating facility in California capable of selling competitively priced renewable energy consistent with the needs of California utilities and would therefore not achieve the purpose and need of the project. Because these alternatives would not support renewable power generation within California, and could have adverse environmental impacts of their own, they were eliminated from further consideration.

3.3.4.1 Natural Gas Generation

Description

Natural gas power generation accounts for approximately 22 percent of all the energy used in the United States and comprises 40 percent of the power generated in California (CEC 2007c). Natural gas power plants typically consist of combustion turbine generators, heat recovery steam generators, a steam turbine generator, wet or dry cooling towers, and associated support equipment. An interconnection with a natural gas pipeline, a water supply, and electric transmission are also required.

A gas-fired power plant generating 400 MW would generally require less than 40 acres of land.

Rationale for Elimination

Although natural gas generation is clearly a viable technology, it is not a renewable technology, so it would not attain BLM's objective of approving renewable energy applications. Therefore, this alternative is not considered in detail as an alternative to the ISEGS project.

Environmental Impact Summary

Natural gas power plants may result in numerous environmental impacts such as the following.

- Overall air quality impacts would increase because natural gas-fired power plants contribute to local violations of PM10 and ozone ambient air quality standards, and operational emissions could result in toxic air contaminants that could adversely affect sensitive receptors. Net increases in greenhouse gas emissions due to natural gas-firing in the conventional power plants would also be adverse.
- Environmental justice may be a concern. Gas-fired power plants tend to be located in developed urban areas that are zoned for heavy industry. In some instances, low-income and minority populations are also located in such areas.
- In order to avoid land use impacts, natural gas-fired power plants must be consistent with local jurisdictions' zoning.
- Several hazardous materials, including regulated substances (aqueous ammonia, hydrogen, and sulfuric acid), would be stored at a natural gas power plant during operation. Aqueous ammonia would be stored in amounts above the threshold quantity during the final stages of construction, initial start-up, and operations phase. Transport of hazardous materials during power plant operation includes delivery of aqueous ammonia and removal of wastes. During operation, the aqueous ammonia transporter would be required to obtain a Hazardous Material Transportation License in accordance with California Vehicle Code section 32105 and would be required to follow appropriate safety procedures and routes.
- Cultural impacts can be severe depending on the power plant siting; however, because natural gas power plants require significantly fewer acres per megawatt

of power generated, impacts to cultural resources would be expected to be fewer than with solar facilities.

- Power plant siting may result in the withdrawal of agriculture lands. However, because natural gas power plants require significantly fewer acres per megawatt of power generated, impacts to agriculture would be expected to be less than with solar facilities should they be sited on agriculture lands.
- Visual impacts may occur with natural gas power plants because they introduce large structures with industrial character. The most prominent structures are frequently the cooling towers, which may reach 100 feet tall, and the power plant stacks, which may reach over 100 feet tall. Visible plumes from the cooling tower would also potentially occur.

3.3.4.2 Coal Generation

Description

Coal-fired electric generating plants are the cornerstone of America's central power system. Traditional coal-fired plants generate large amounts of greenhouse gases. New "clean coal technology" includes a variety of energy processes that reduce air emission and other pollutants from coal-burning power plants. The Clean Coal Power Initiative is providing government co-financing for new coal technologies that help utilities meet the Clear Skies Initiative to cut sulfur, nitrogen, and mercury pollutants by nearly 70 percent by 2018. The Clean Coal Power Initiative is now focusing on developing projects that utilize carbon sequestration technologies and/or beneficial reuse of carbon dioxide (DOE 2008). However, these technologies are not yet in use.

In 2006, approximately 15.7 percent of the energy used in California came from coal fired sources; 38 percent of this was generated in state, and 62 percent was imported (CEC 2007c). The in-state coal-fired generation includes electricity generated from out-of-state, coal-fired power plants owned by and reported by California utilities (CEC 2007c). In 2006, California enacted SB 1368 (Perata, Chapter 598, Statutes of 2006), which prohibits utilities from making long-term commitments for electricity generated from plants that create more carbon dioxide (CO_2) than clean-burning natural gas plants (CEC 2007c).

Rationale for Elimination

Although coal generation is a viable technology, it is not a renewable technology, so it would not attain BLM's objective of approving renewable energy applications. Therefore, coal generation was eliminated from detailed analysis.

Environmental Impact Summary

Coal-fired power plants may also result in numerous environmental impacts such as the following.

- Overall, air quality impacts would increase because coal-fired power plants contribute carbon dioxide, sulfur dioxide, nitrogen oxides, mercury, and fly ash (EPA 2008b). Mining, cleaning, and transporting coal to the power plants generates additional emissions. Average emissions of a coal-fired power plant

are 2,249 pounds per megawatt hour of carbon dioxide, 13 pounds per megawatt hour of sulfur dioxide and 6 pounds per megawatt hour of nitrogen oxides (EPA 2008b). Net increases in greenhouse gas emissions due to coal-firing in the conventional power plants would be substantial.

- Health risks associated with power plants have also been documented, including problems associated with exposure to fine particle pollution or soot, an increase in asthma, and an increase in non-fatal heart attacks.
- Large quantities of water are generally required to produce steam and for cooling. When coal-fired power plants use water from a lake or river, fish or other aquatic life can be impacted (EPA 2008a).

3.3.4.3 Nuclear Energy

Description

Due to environmental and safety concerns, California law currently prohibits the construction of any new nuclear power plants in California until the California Energy Commission finds that the federal government has approved and there exists a demonstrated technology for the permanent disposal of spent fuel from these facilities (CEC 2006). In June 1976, California enacted legislation directing the Energy Commission to perform an independent investigation of the nuclear fuel cycle. This investigation was to assess whether the technology to reprocess nuclear fuel rods or to dispose of permanently high-level nuclear waste had been demonstrated and approved and was operational (Public Resources Code 25524.1 (a) (1), 25524.1 (b), and 25524.2 (a)). After extensive public hearings, the Energy Commission determined that it could not make the requisite affirmative findings concerning either reprocessing of nuclear fuel or disposal of high-level waste. This information was published in a report: *Status of Nuclear Fuel Reprocessing, Spent Fuel Storage and High-level Waste Disposal*, Energy Commission publication P102-78-001, January 1978.) As a result, the development of new nuclear energy facilities in California was prohibited by law.

It has been more than 25 years since the last comprehensive Energy Commission assessment of nuclear power issues. The *Nuclear Power in California: 2007 Status Report* was published in October of 2007, and gives a detailed description of the current nuclear waste issues and their implications for California. This was prepared as part of the development of the Energy Commission's *2007 Integrated Energy Policy Report* (CEC 2007d).

Rationale for Elimination

The permitting of new nuclear facilities in California is currently illegal, so this technology is infeasible as an alternative to the proposed project.

3.3.4.4 Conservation and Demand-Side Management

Description

Conservation and demand-side management consist of a variety of approaches to reduction of electricity use, including energy efficiency and conservation, building and appliance standards, and load management and fuel substitution. In 2005 the Energy

Commission and CPUC's Energy Action Plan II declared cost effective energy efficiency as the resource of first choice for meeting California's energy needs. The Energy Commission noted that energy efficiency helped flatten the state's per capita electricity use and saved consumers more than $56 billion since 1978 (CPUC 2008b). The investor-owned utilities' 2006-2008 efficiency portfolio marks the single-largest energy efficiency campaign in U.S. history, with a $2 billion investment by California's energy ratepayers (CPUC 2008b). However, with population growth, increasing demand for energy, and the need to reduce greenhouse gases, there is a greater need for energy efficiency.

The CPUC, with support from the Governor's Office, the Energy Commission, and the California Air Resources Board, among others, adopted the California Long-Term Energy Efficiency Strategy Plan for 2009 to 2020 in September 2008 (CPUC 2008b). The plan is a framework for all sectors in California including industry, agriculture, large and small businesses, and households. Major goals of the plan include:

- All new residential construction will be zero net energy by 2020;
- All new commercial construction will be zero net energy by 2030;
- Heating, ventilation, and air conditioning industries will be re-shaped to deliver maximum performance systems;
- Eligible low-income customers will be able to participate in the Low Income Energy Efficiency program and will be provided with cost-effective energy efficiency measures in their residences by 2020.

Rationale for Elimination

Conservation and demand-side management is important for California's energy future and cost effective energy efficiency is considered as the resource of first choice for meeting California's energy needs. However, with population growth and increasing demand for energy, conservation and demand-management alone is not sufficient to address all of California's energy needs. Additionally, it will not attain BLM's objective of approving renewable energy applications and it is not within the framework of BLM authority to require energy conservation.

3.3.5 Phased Approval Alternative

Description

Although not initially identified as a potential alternative by BLM, public comments on the DEIS recommended consideration of an alternative in which only the ROW for Ivanpah Unit 1 was approved, with approval of the ROWs for Units 2 and 3 being withheld until additional construction and operational information was obtained. In the DEIS, it was acknowledged that the proposed project was the first of this scale and technology proposed on federal lands, and that uncertainties regarding potential impacts existed. To address these uncertainties, BLM proposed mitigation measures for some resource areas, including Soil and Water and Traffic, that would require monitoring of impacts, and response actions should impacts be identified. However, the comment recommending phased approval provides another potential method for addressing these uncertainties.

Under the Phased Approval alternative, BLM would approve the ROW for Ivanpah Unit 1, and would monitor impacts associated with construction and operation of the unit. The Phased Approval Alternative could ultimately incorporate portions of other reasonable alternatives, including an alternative site, reduced acreage alternative, or alternative solar, other renewable, or other generation technology, depending on the results of the impact monitoring and the identification of potential options. At an undefined time during, or following, the completion of Ivanpah Unit 1, BLM would consider the impacts that had resulted during Ivanpah Unit 1 construction and/or operation, and either approve Units 2 and 3 as proposed, recommend approval with modifications, or recommend no approval. Modifications to be considered could include, if reasonable, alternative sites, alternative technologies, alternative construction or operation procedures, and modified mitigation measures.

Rationale for Elimination

Although it could potentially result in fewer impacts, the Phased Approval alternative is likely to be economically infeasible for the applicant because they would not qualify for the DOE federal loan guarantee program under the EPAct of 2005. In response to the public comment on this issue, BLM has reviewed the monitoring requirements that were included within the mitigation measures proposed in the DEIS to address potentially uncertain impacts to verify that they would be effective. Based on this review, the mitigation measures provide the flexibility necessary to respond to newly identified impacts and conditions, and phased approval would not likely reduce those impacts further. Also, BLM's ROW regulations allow for adjustments to grant conditions after ROW grant approval, and this mechanism would effectively perform the same function as Phased Approval.

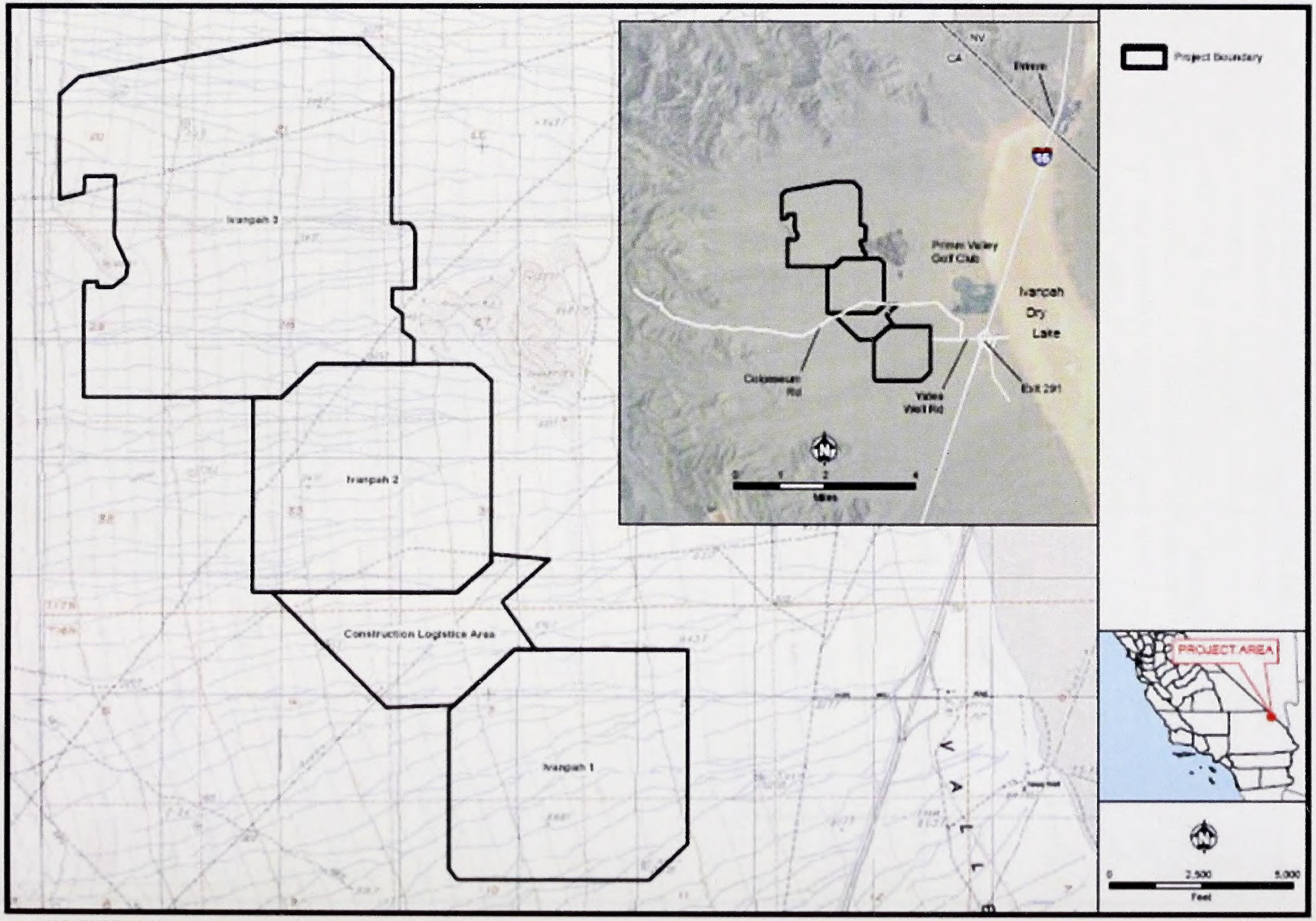
Environmental Impact Summary

The Phased Approval Alternative would likely have a reduced level of impacts from the proposed project because it would include project modifications to address impacts that were actually observed during construction and operation of Ivanpah Unit 1. By being based upon actually operational data, it is possible that project modifications for Units 2 and 3 could be more effective in reducing impacts. However, the Phased Approval Alternative would likely not be economically feasible for the developer. Because ultimate approval of the ROWs for Units 2 and 3 would be uncertain, it is unlikely that the developer would receive the necessary financing, including Federal and State incentives for renewable energy development, to proceed with the project.

Figure 3.1
Ivanpah Solar Electric Generating System - Regional Setting

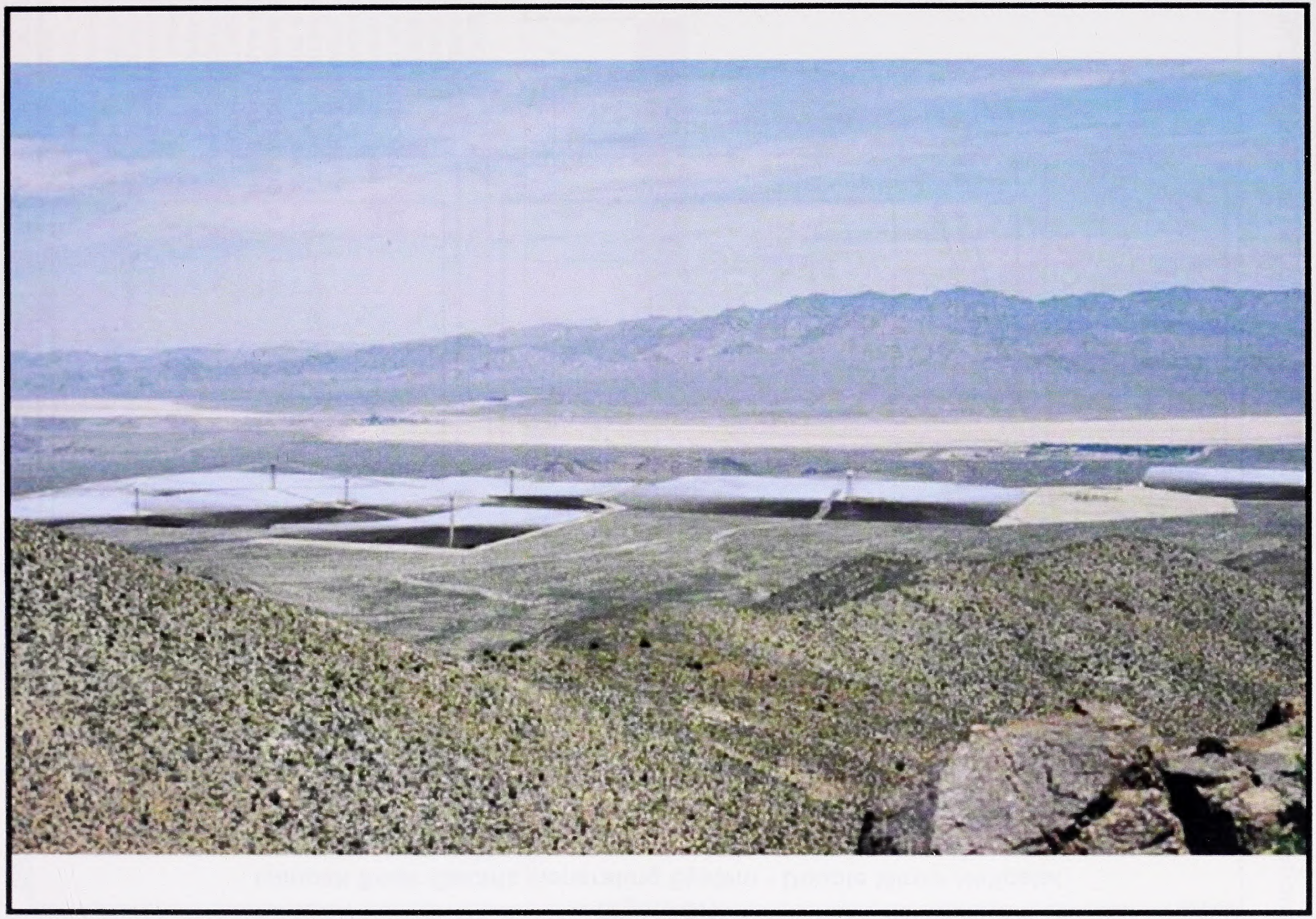
U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: AFC Figure 1

Figure 3.2
Ivanpah Solar Electric Generating System - Local Setting



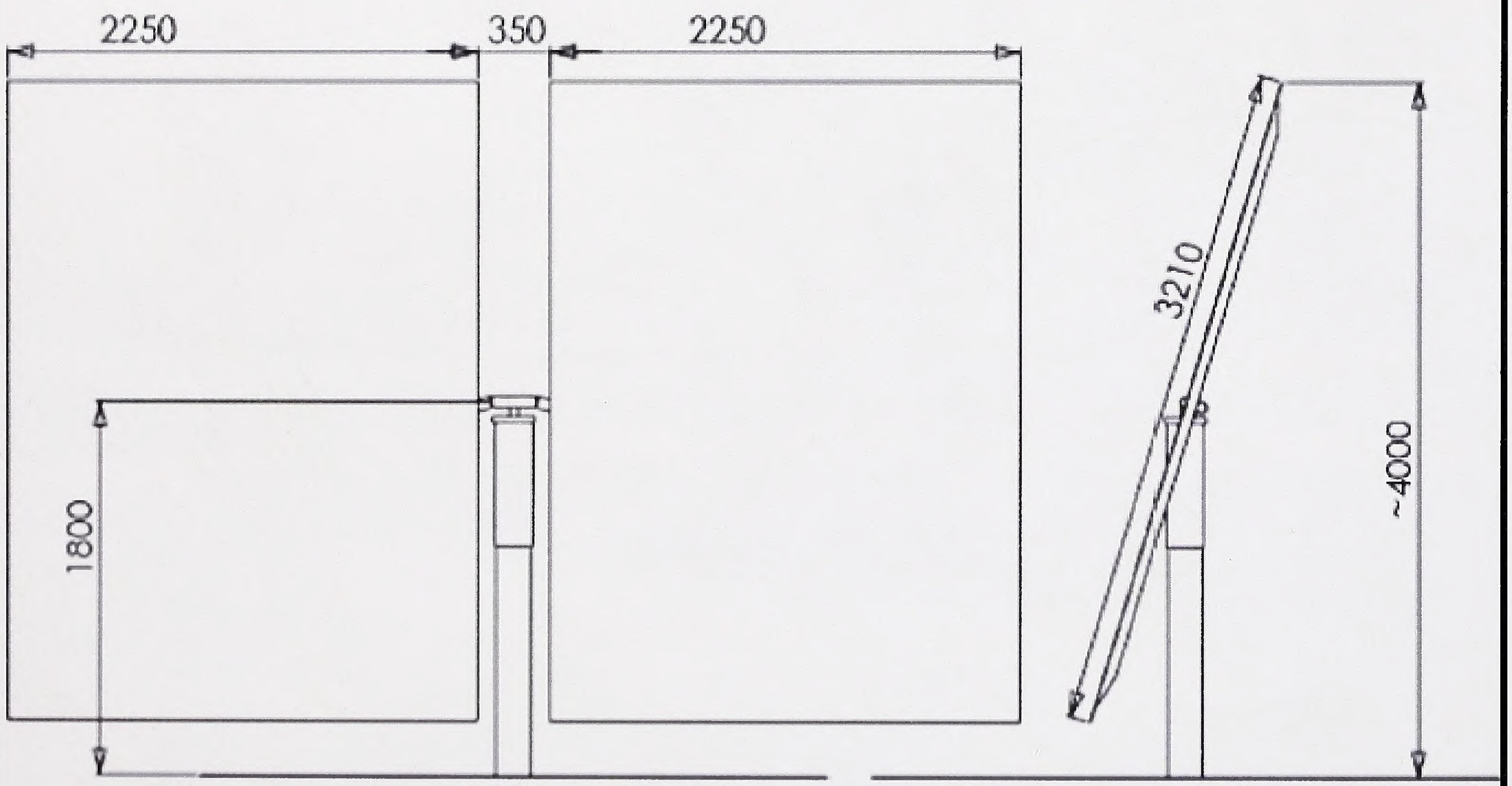
U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: Attachment DR130-2B Figure 1

Figure 3.3
Ivanpah Solar Electric Generating System - Visual Simulation view from Benson Mine / Mojave Preserve



U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: Data Response Set 2C #148 Figure DR 147-3

Figure 3.4
Ivanpah Solar Electric Generating System - Double Mirror Heliostat

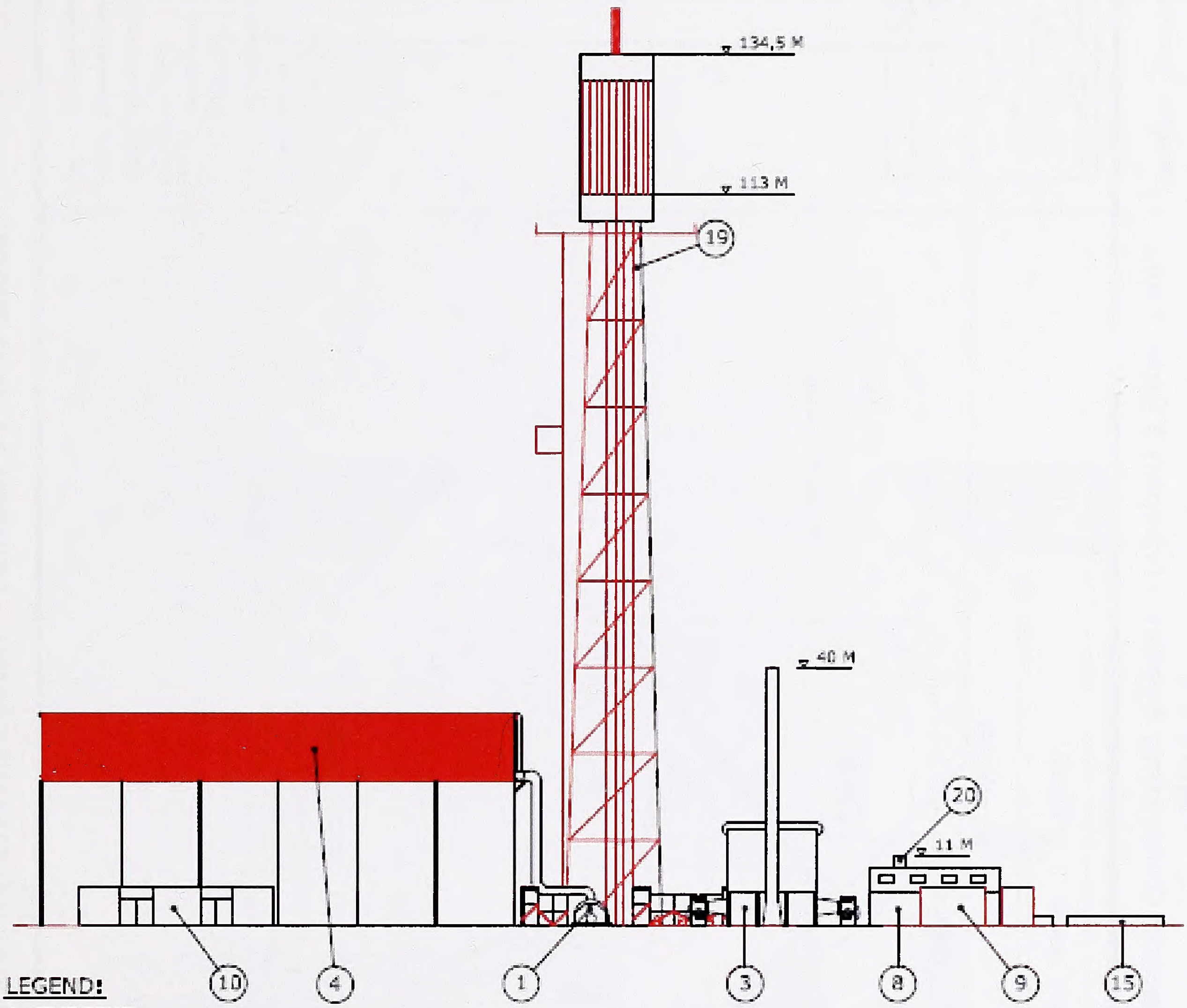


Double-mirror heliostat

Note: Units are in millimeters.

U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: DR SET 1D # 102-1R

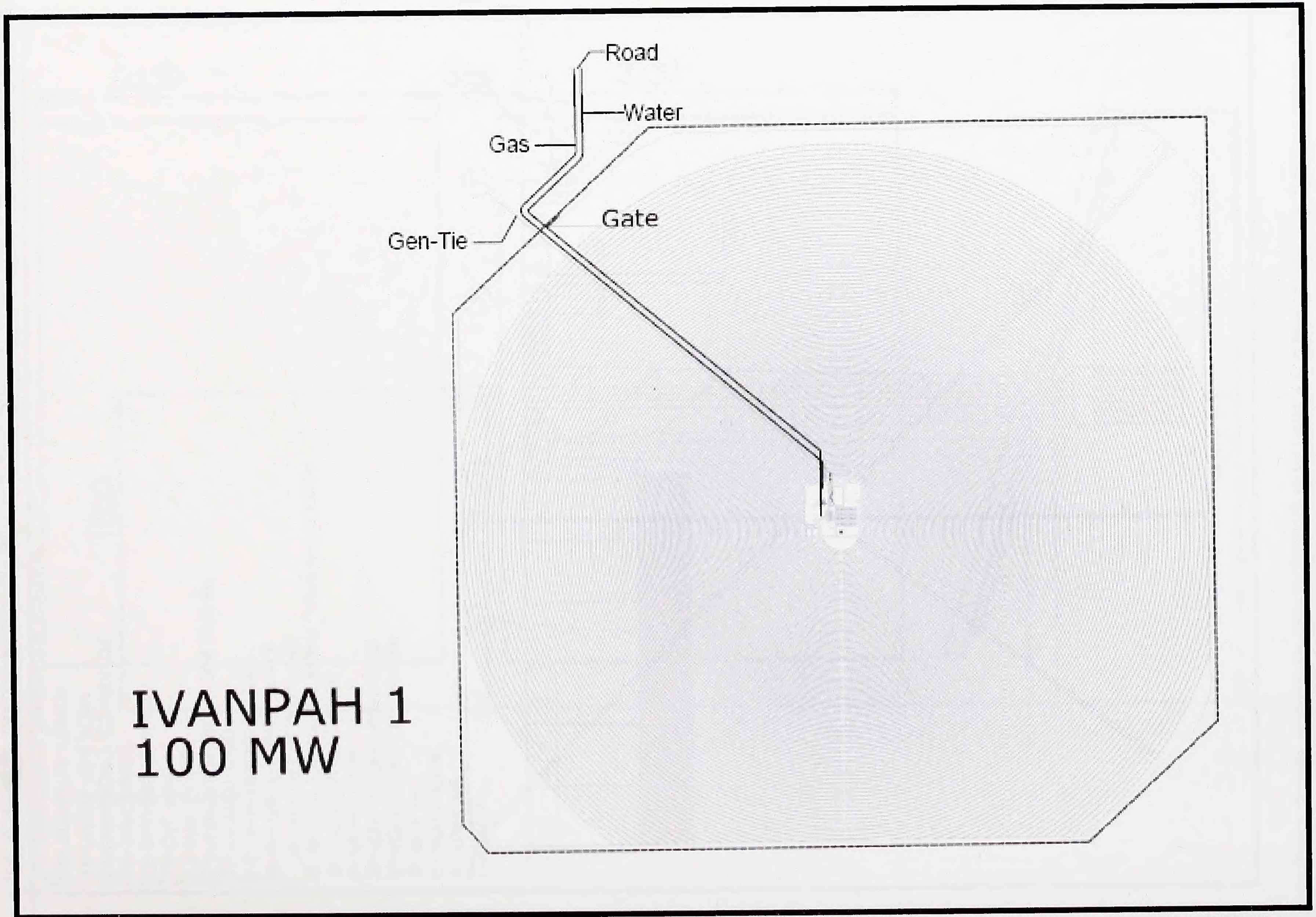
Figure 3.5
Ivanpah Solar Electric Generating System - Power Block Power Tower Elevations



LEGEND:
1- TURBINE
2- GENERATOR
3- BOILER
4- AIR COOLED CONDENSER
5- FEED WATER PREHEATER
6- DEAERATOR
7- STEAM DISTRIBUTOR
8- WATER TREATMENT PLANT ,ADMINISTRATION
& ELECTRICAL BUILDING
9- WATER STORAGE TANKS
10- MAINTENANCE WING
11-SWITCH YARD
12-TURBINE LUBRICATION SYSTEM
13-PIPE BRIDGE
14-GAS PIPE
15-EVAPORATION PITS
16-[RESERVED]
17-EMERGENCY GENERATOR
18-DIESEL FIRE PUMP
19- REHEATER TOWER
20- EMERGENCY GENERATOR EXHAUST

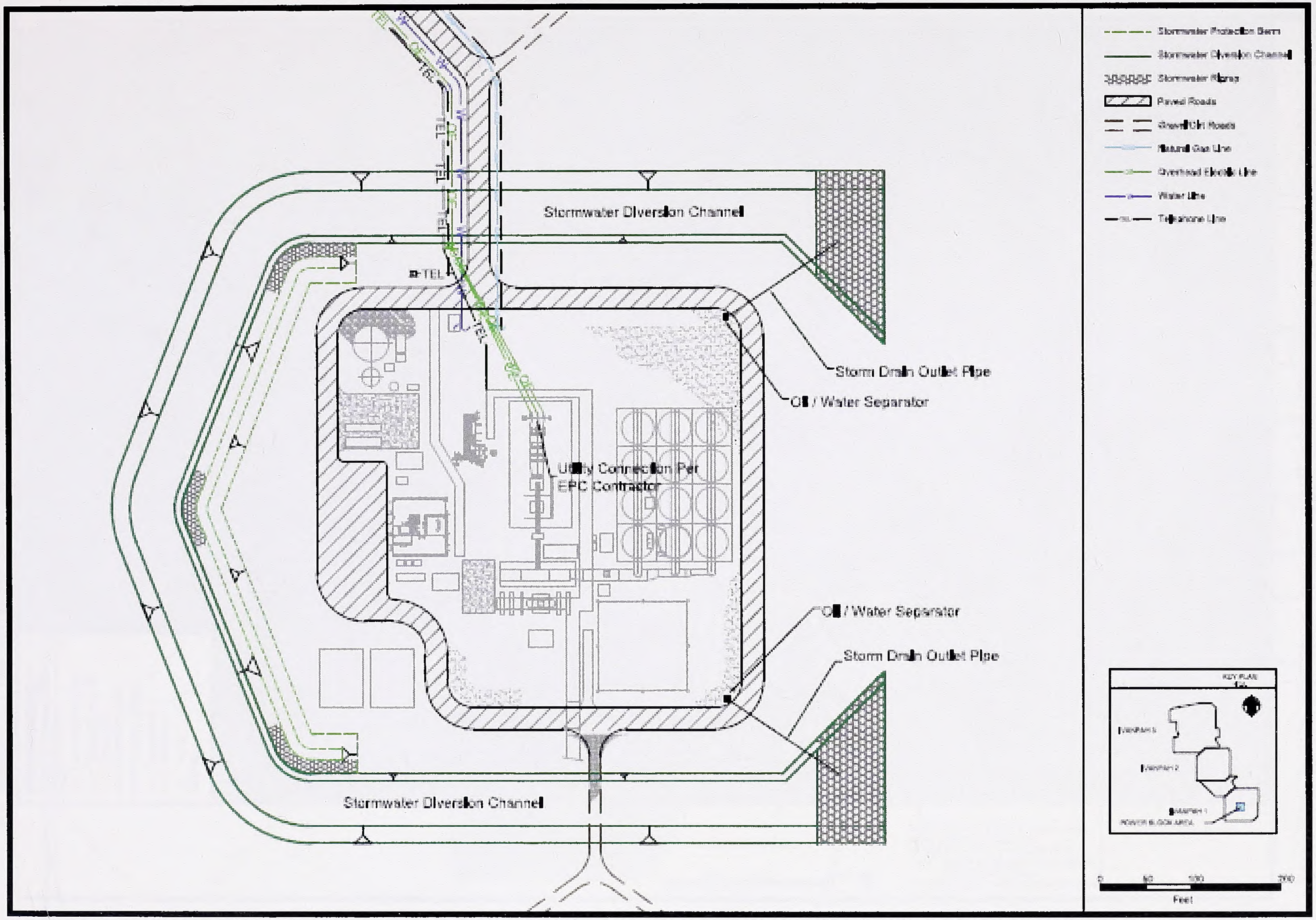
U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: AFC Figure 2.2-C

Figure 3.6
Ivanpah Solar Electric Generating System - Ivanpah 1 Solar Field



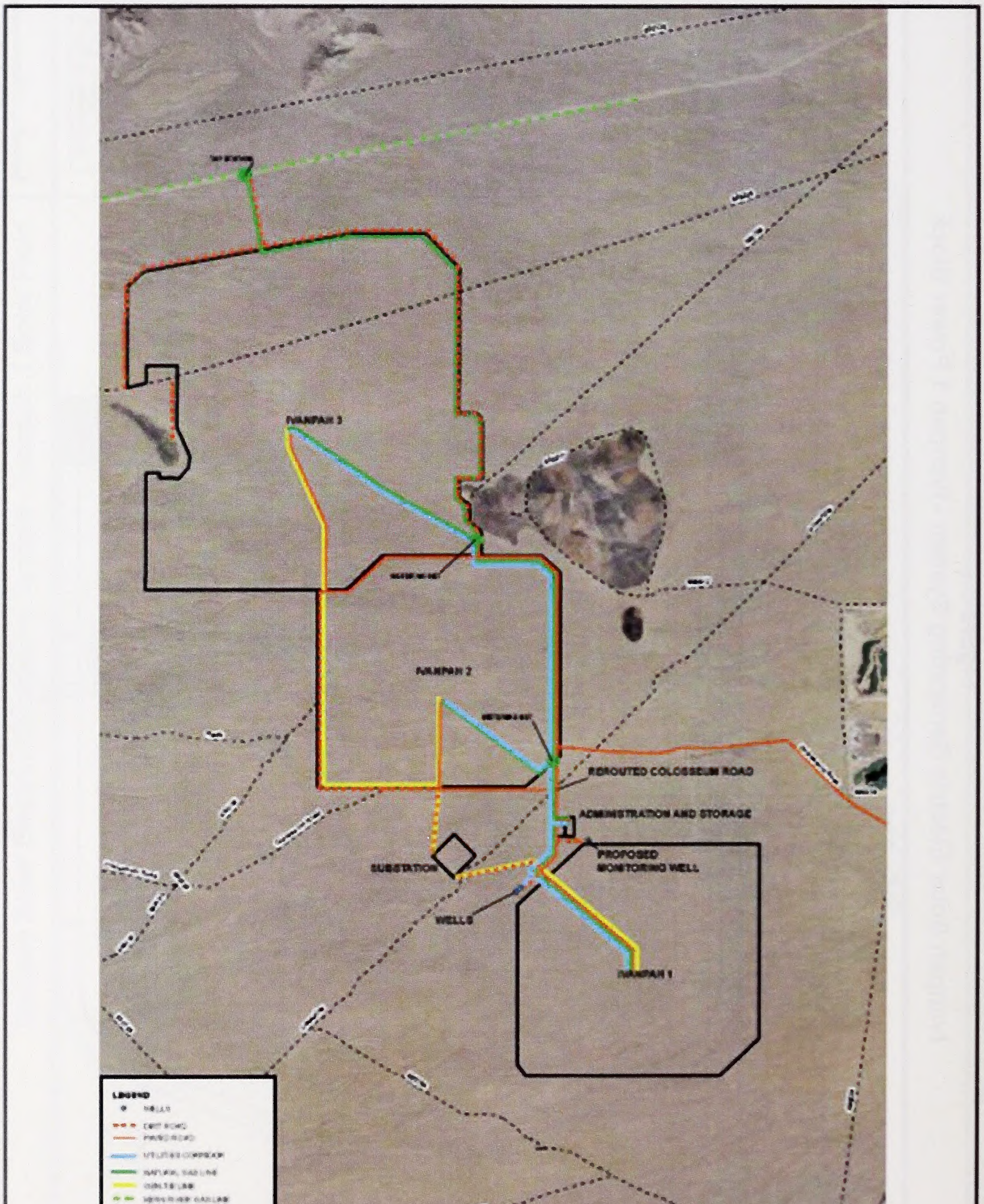
U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: Data Response Set 1D- Figure DR4-1

Figure 3.7
Ivanpah Solar Electric Generating System - Ivanpah 1 Power Block



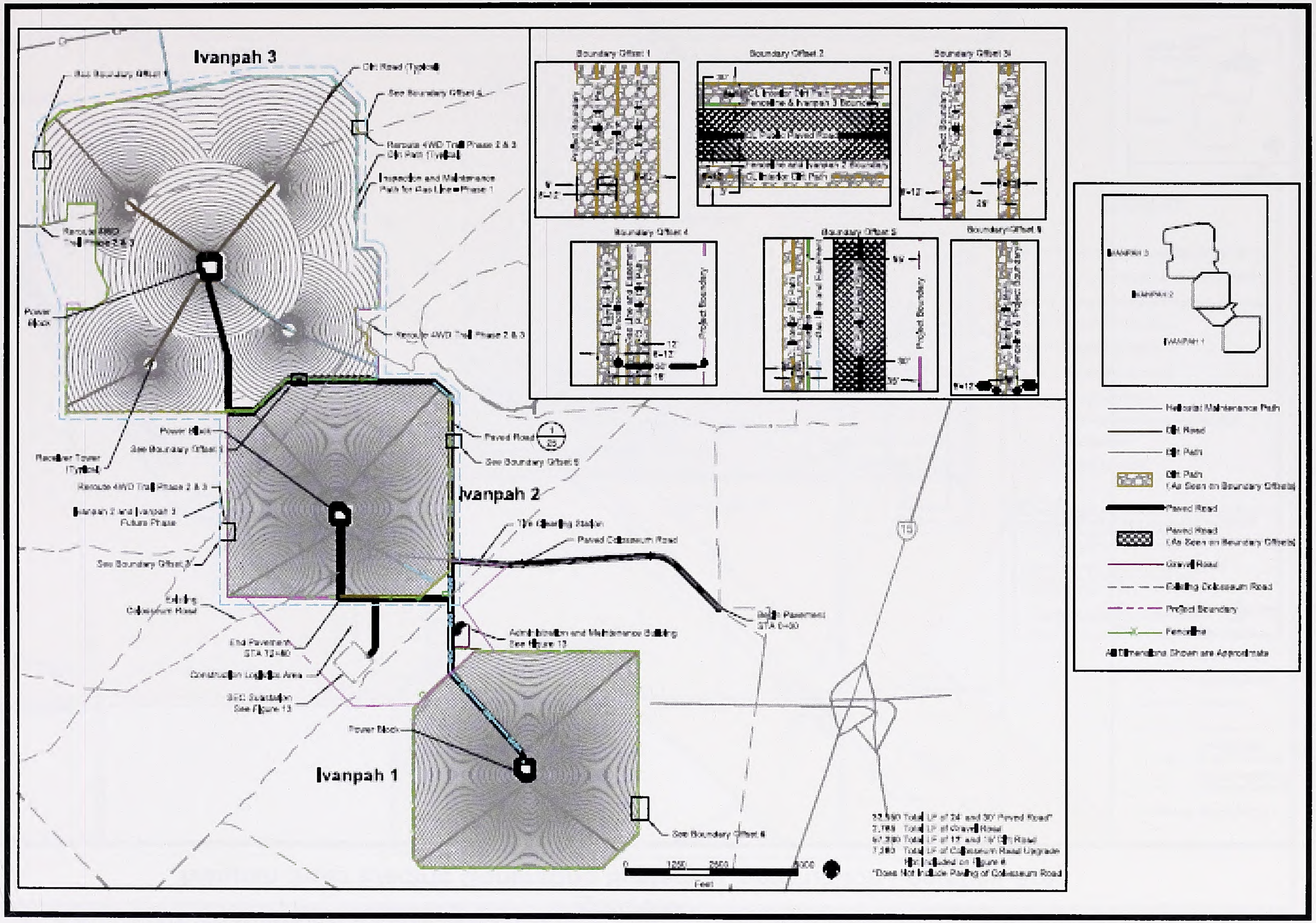
U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: Attachment DR130-2B Figure 7

Figure 3.8
Ivanpah Solar Electric Generating System - Site Plan and Linear Facilities



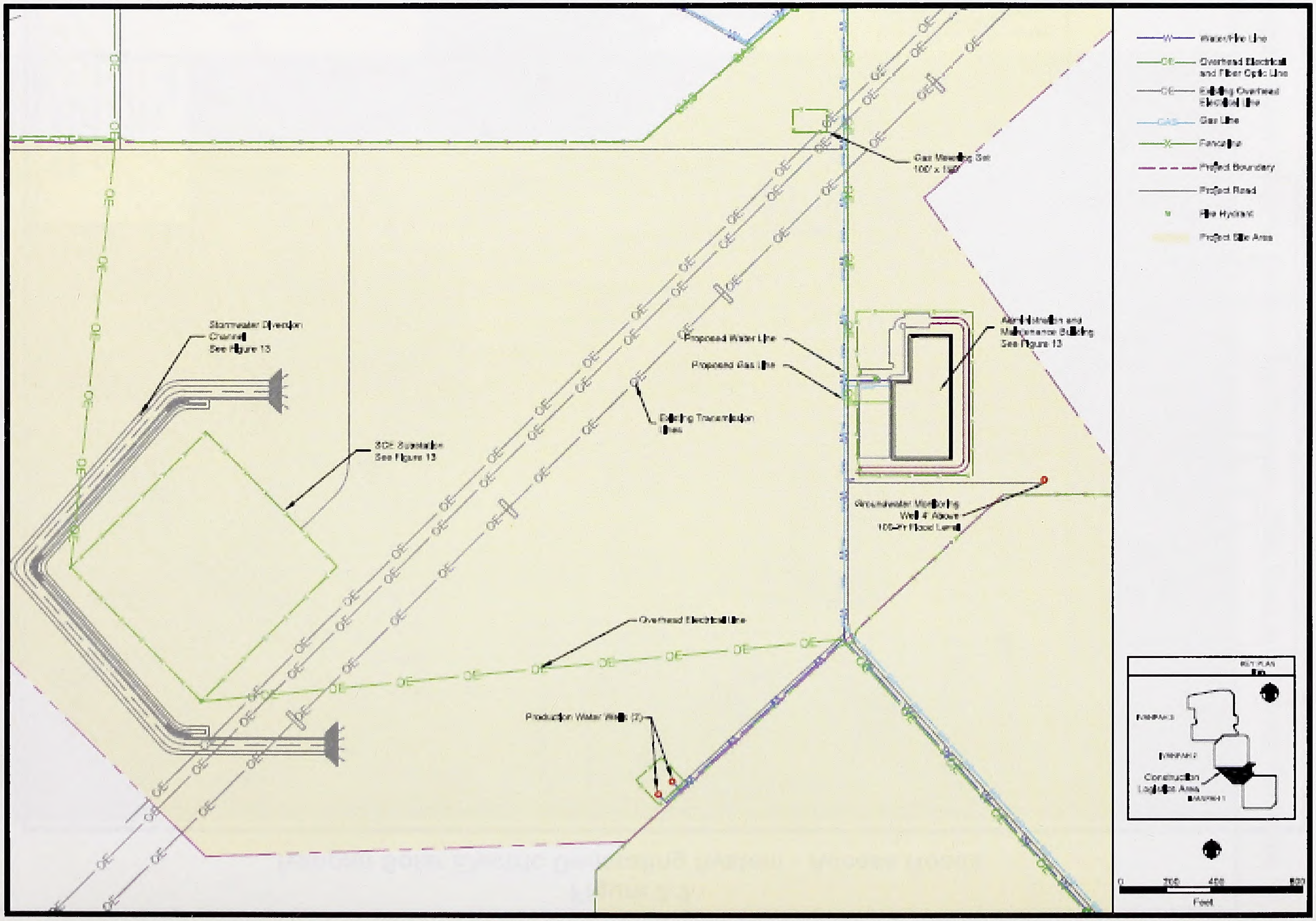
U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: Data Response 21 - Fig.1 - Trails

Figure 3.9
Ivanpah Solar Electric Generating System - Access Roads



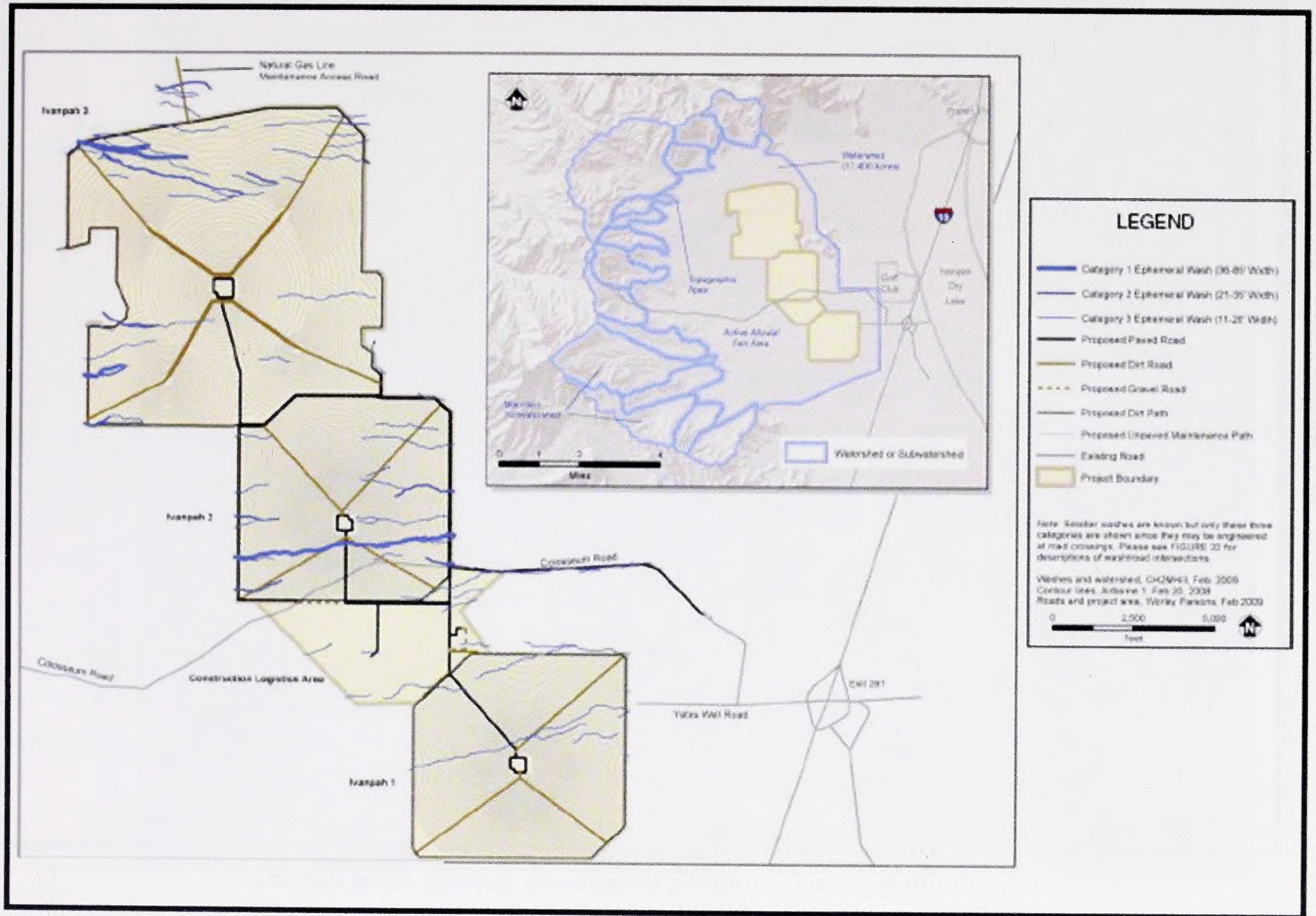
U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: Attachment DR130-2B Figure 15

Figure 3.10
Ivanpah Solar Electric Generating System - Construction Logistics Area



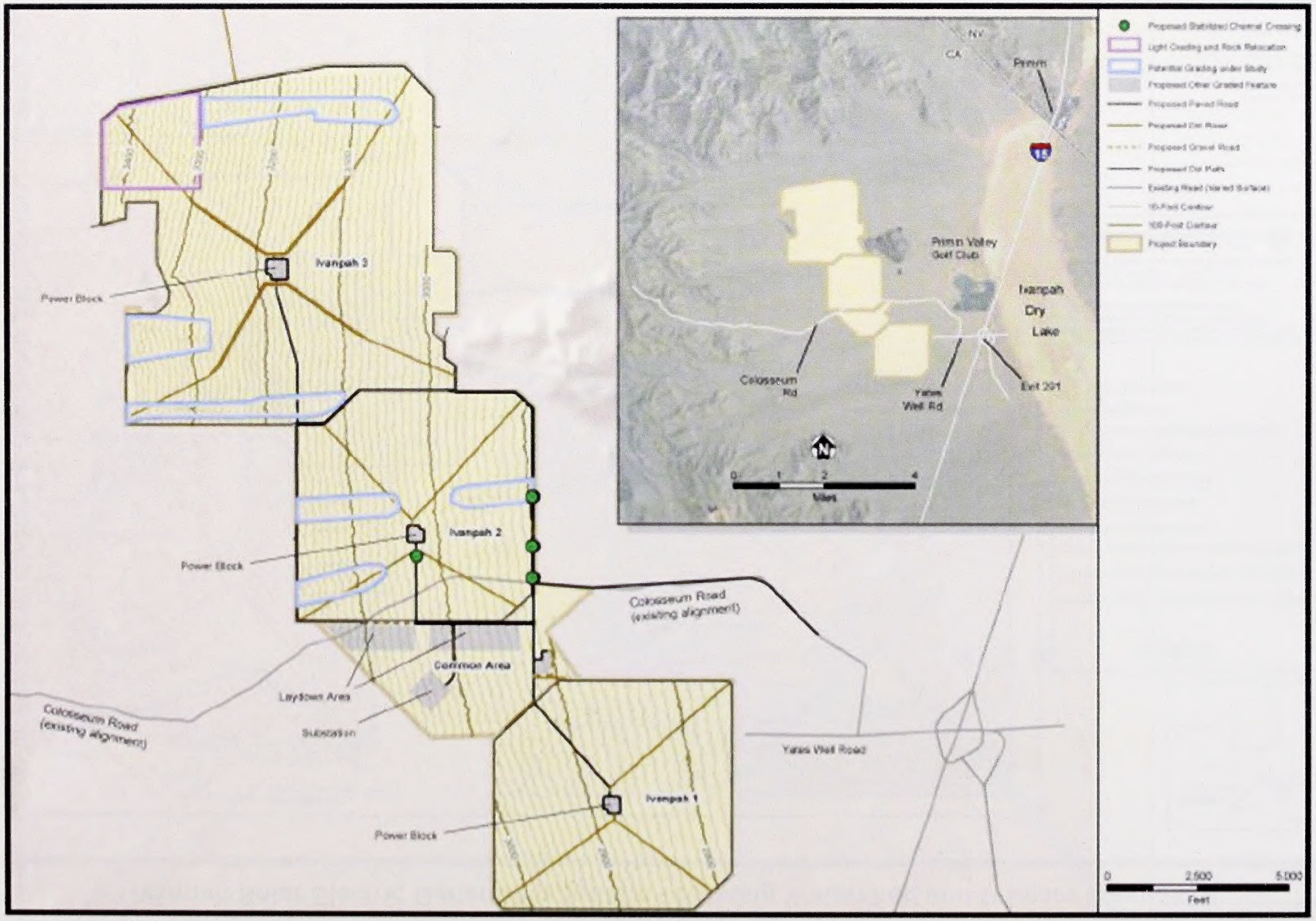
U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: Attachment DR130-2B Figure 4

Figure 3.11
Ivanpah Solar Electric Generating System - Existing Watershed and Primary Washes



U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: Attachment DR130-2B Figure 8

Figure 3.12
Ivanpah Solar Electric Generating System - Overall Grading Plan



U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: Attachment DR130-2B Figure 11

Figure 3.13
Site Plan for Mitigated Ivanpah 3 Alternative (Source: BSE 2010a)

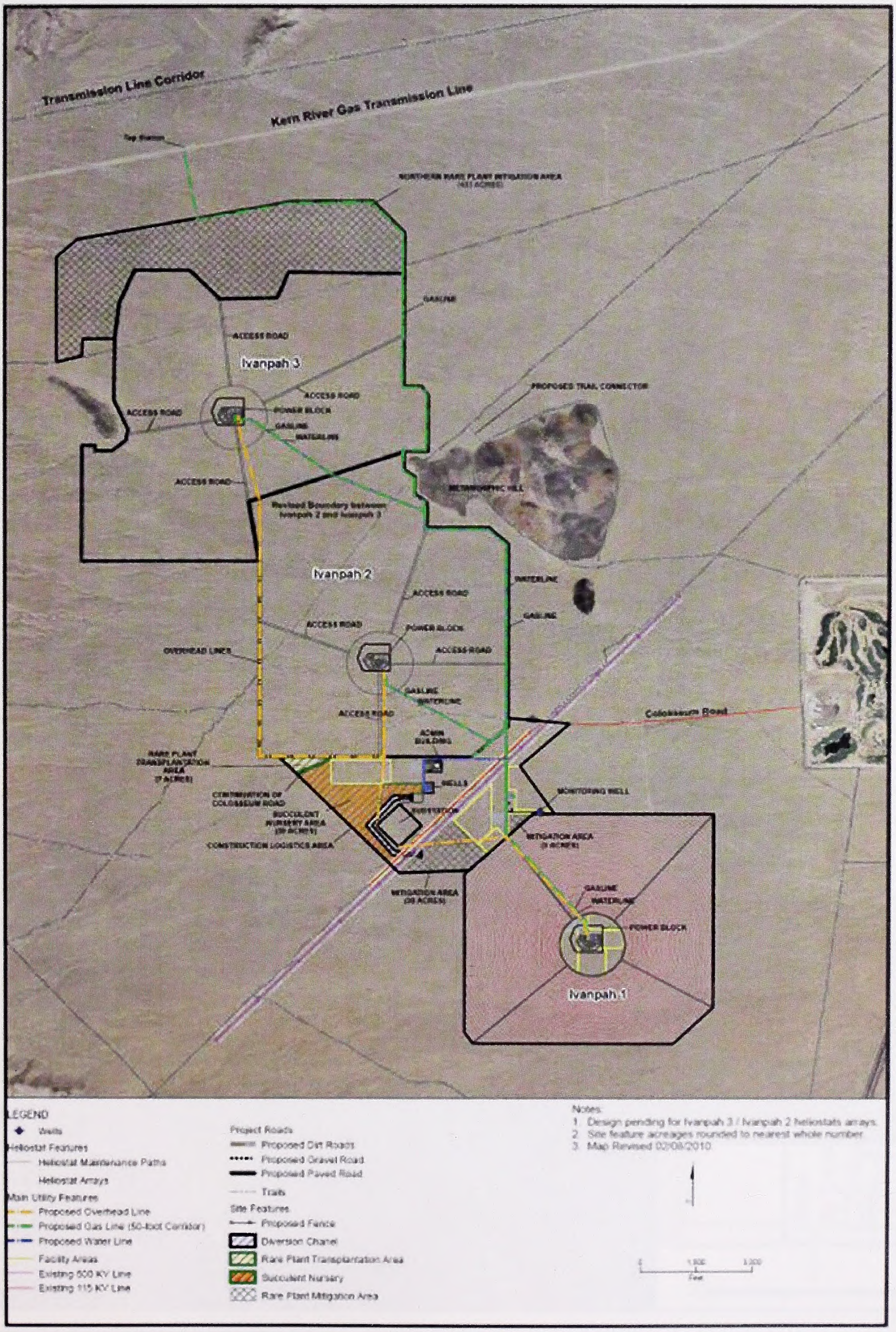


Figure 3-14
Reconfigured Unit 3 in Modified I-15 Alternative (Source: From BSE 2010b)

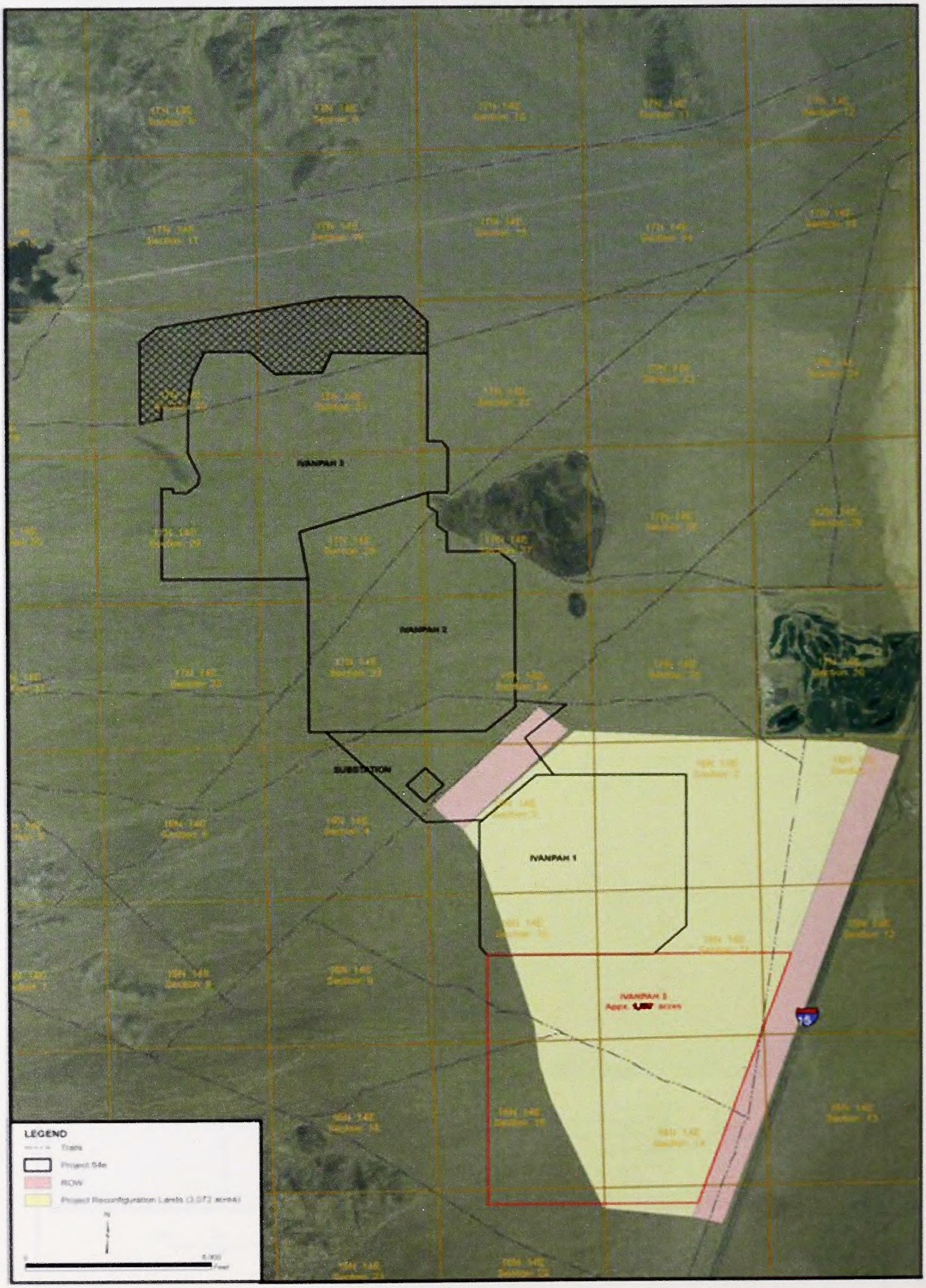
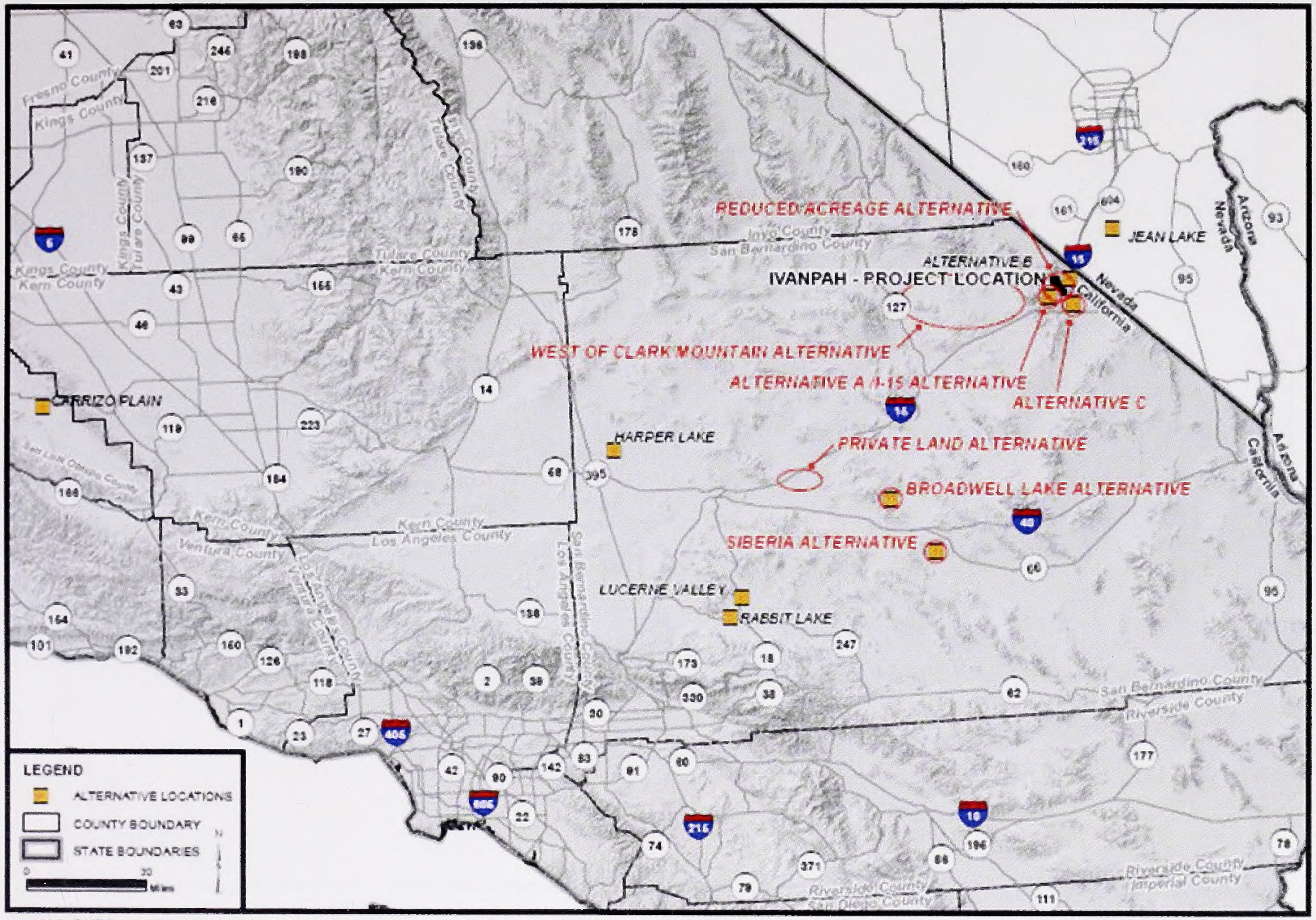


Figure 3-15
ISEGS - Locations of Alternatives Eliminated (in red)



U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: BSE, 2007a

Figure 3-16
ISEGS – Alternative Regional Locations

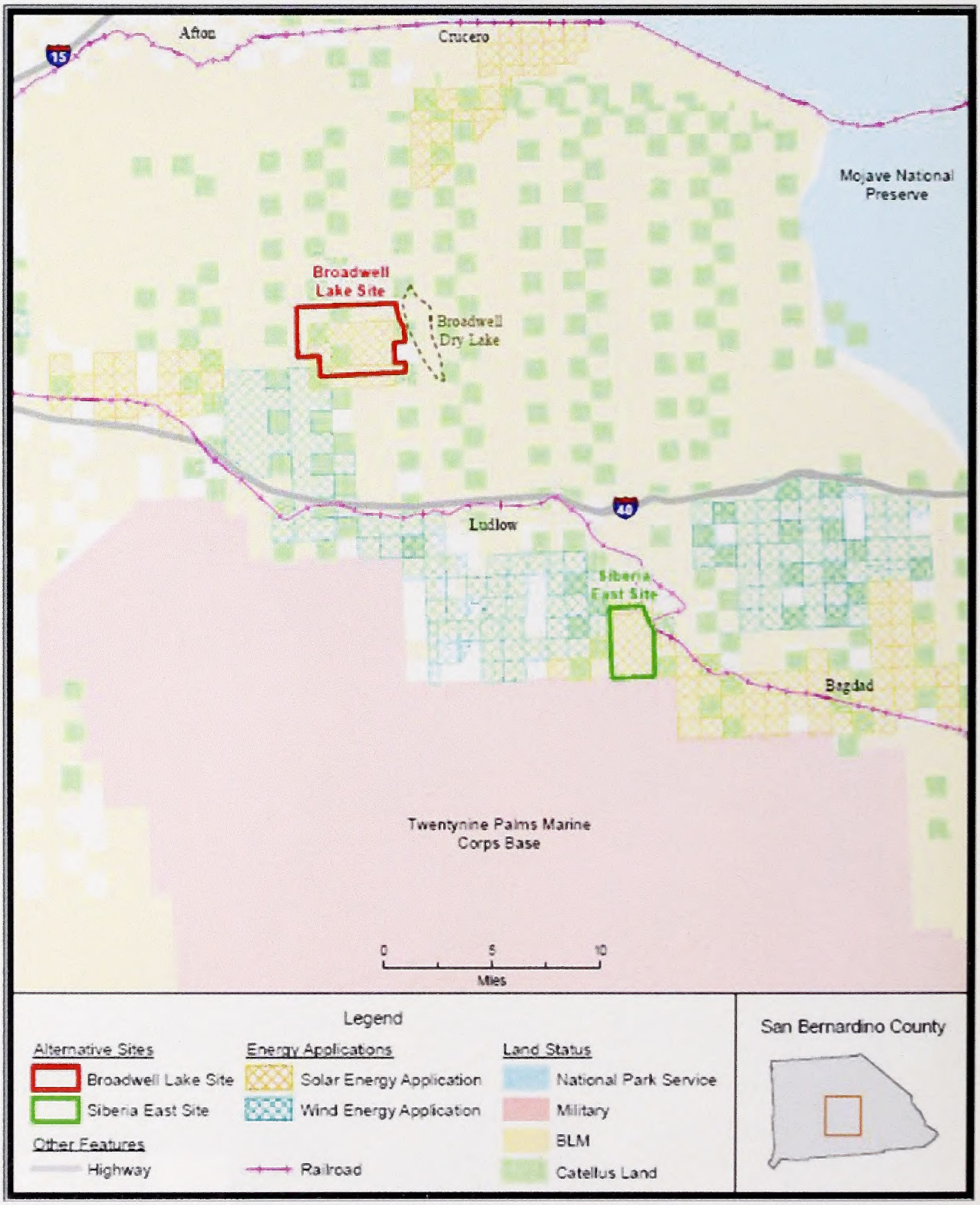
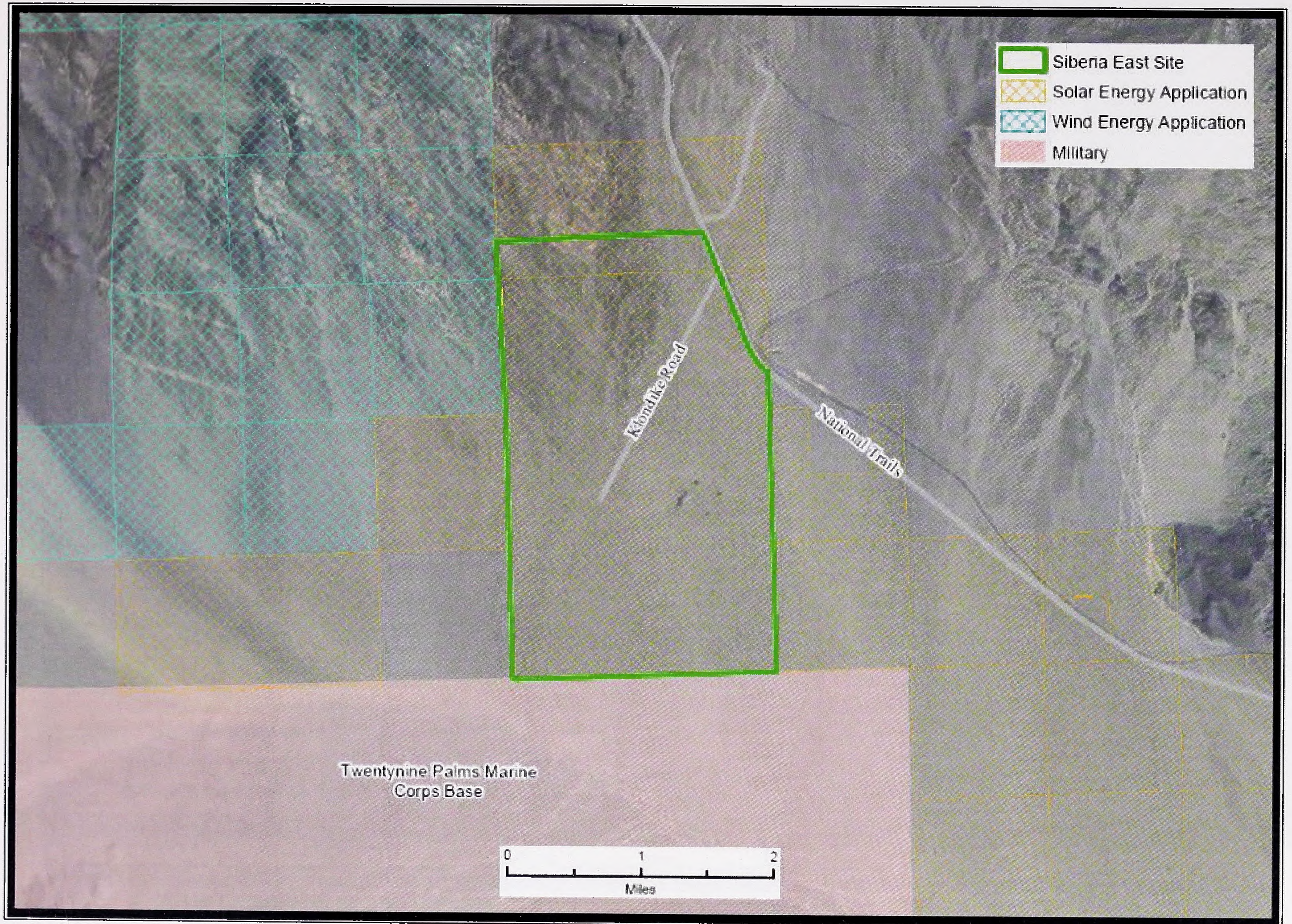
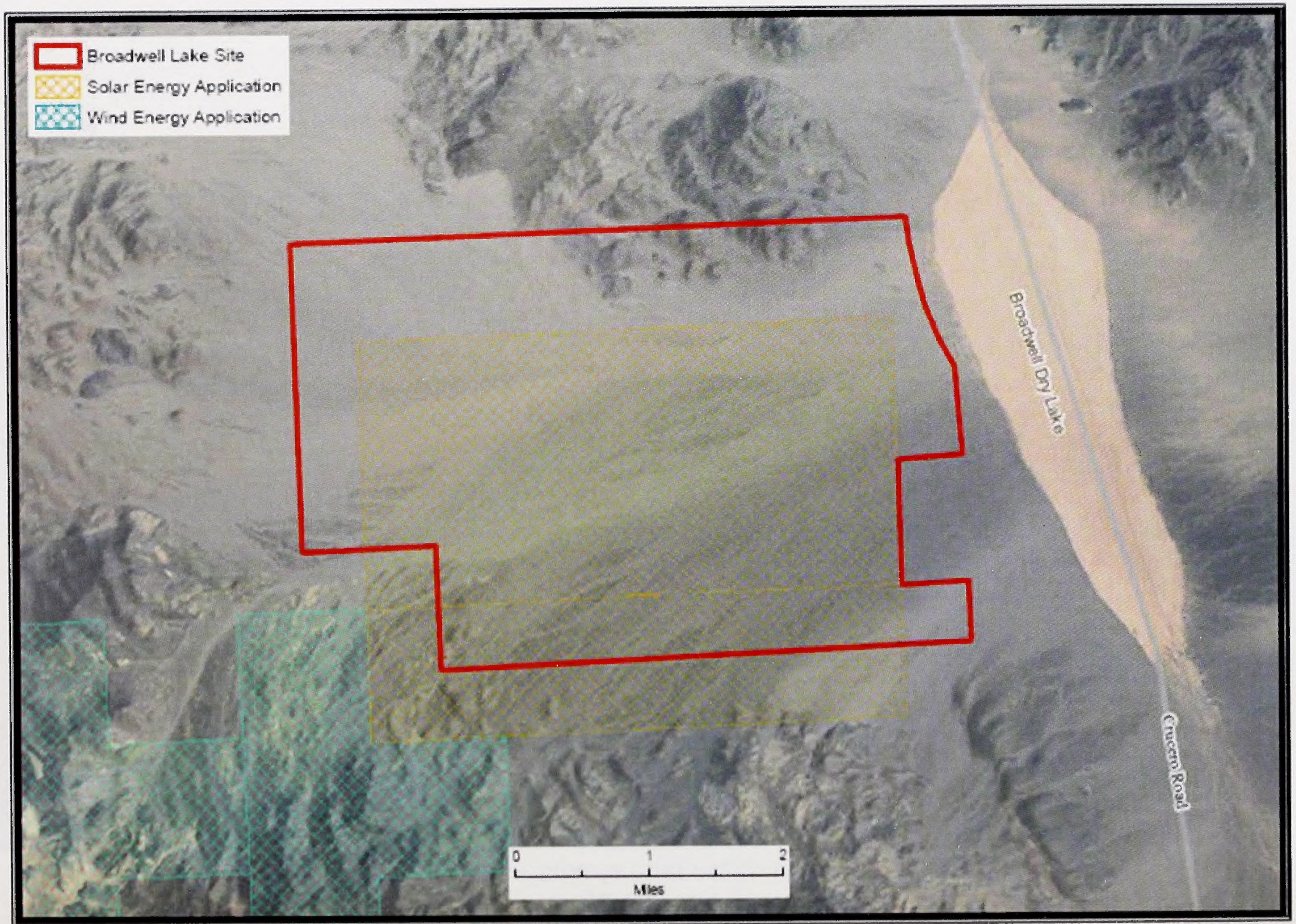


Figure 3-17
ISEGS – Siberia East Alternative



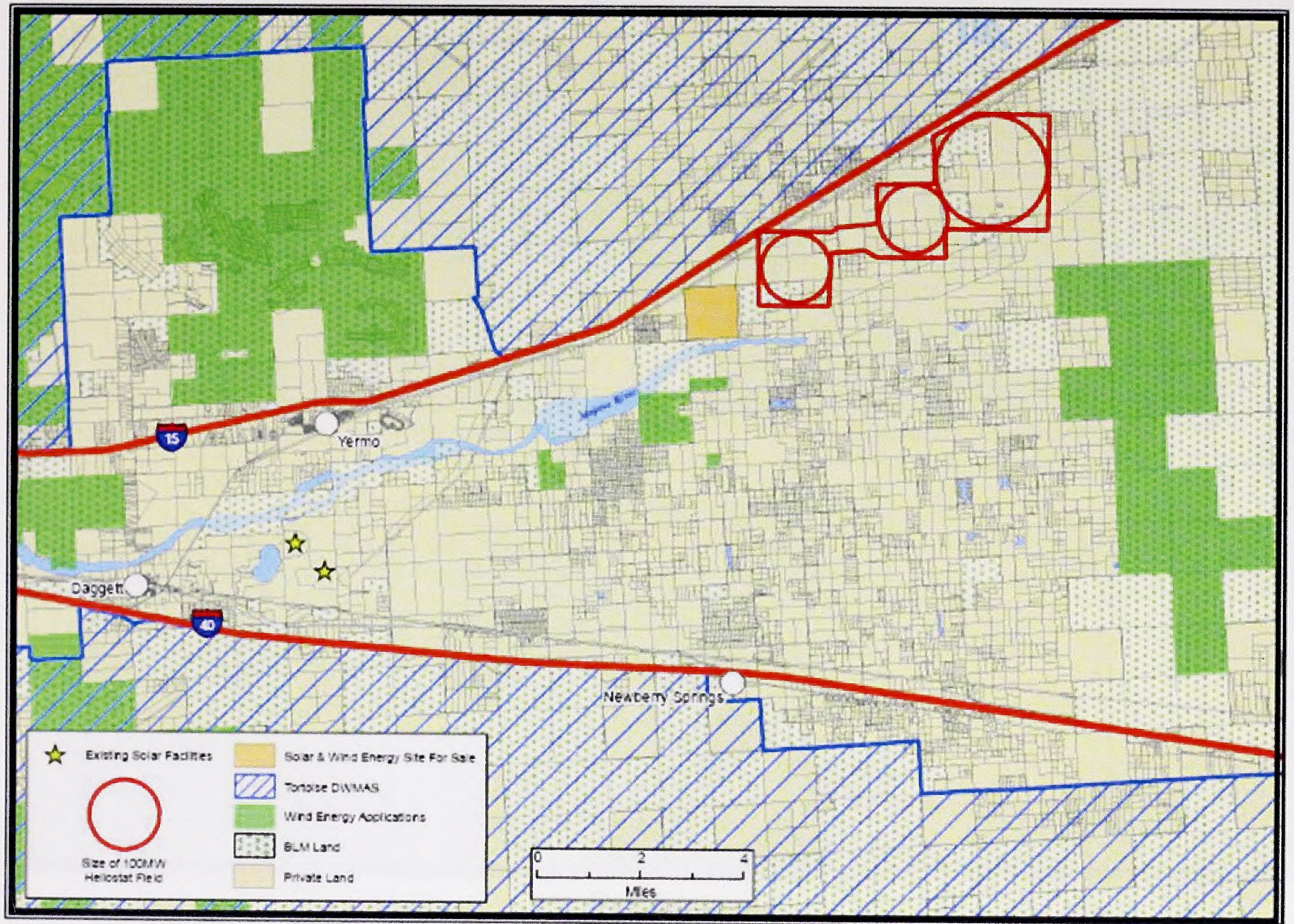
U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: BLM, 2008

Figure 3-18
ISEGS – Broadwell Lake Alternative



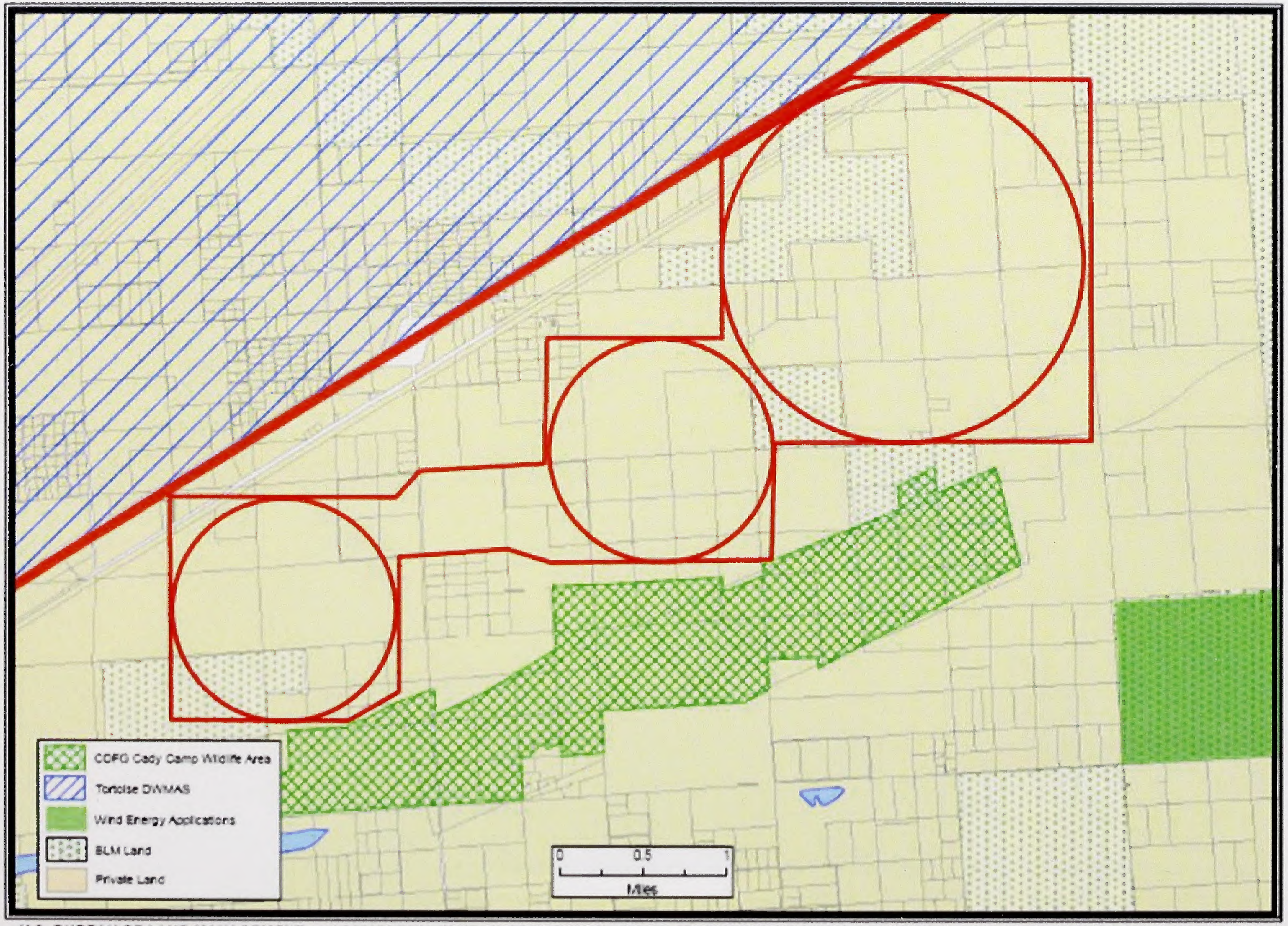
U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: BLM, 2008

Figure 3-19A
ISEGS – Private Land Alternative



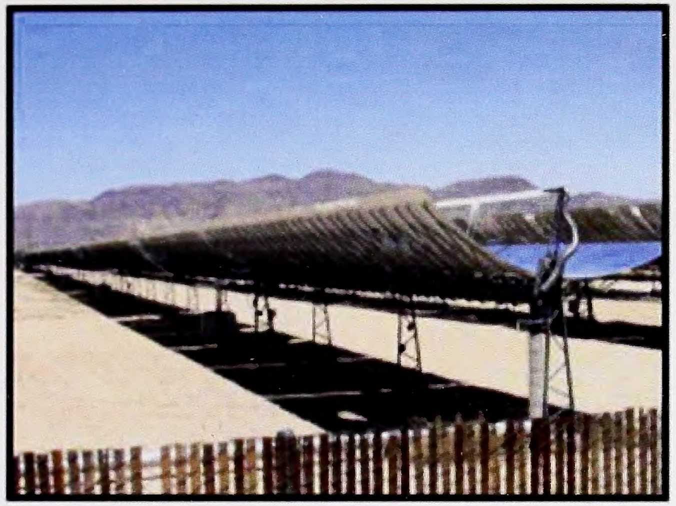
U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: California Energy Commission - Tele Atlas Data - San Bernardino County

Figure 3-19B
ISEGS – Private Land Alternative Detail



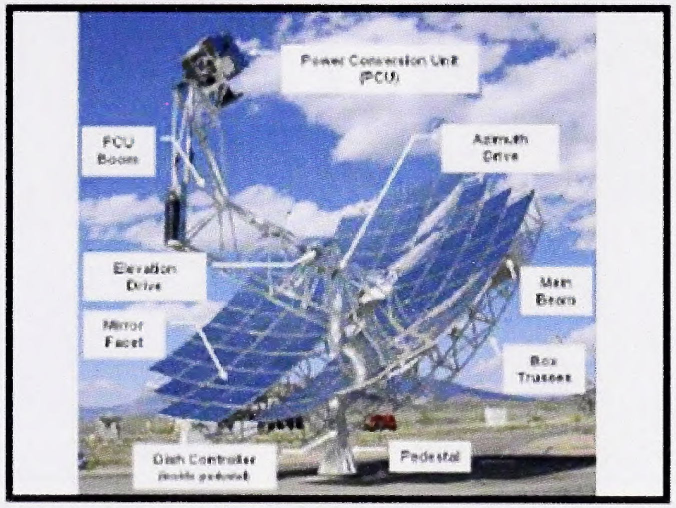
U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: California Energy Commission - Tele Atlas Data - San Bernardino County

Figure 3-20
ISEGS – Solar Generation Technologies



Parabolic through technology as used in Daggett, CA

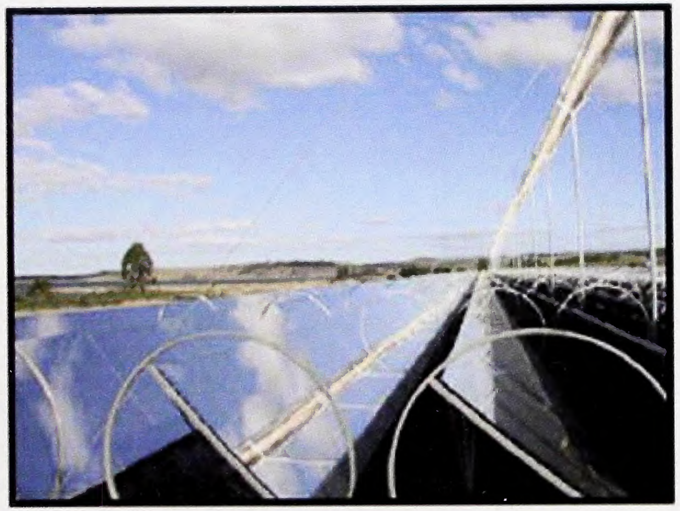
Parabolic through technology in a 64 MW field
(Nevada SolarOne in Boulder City, NV)



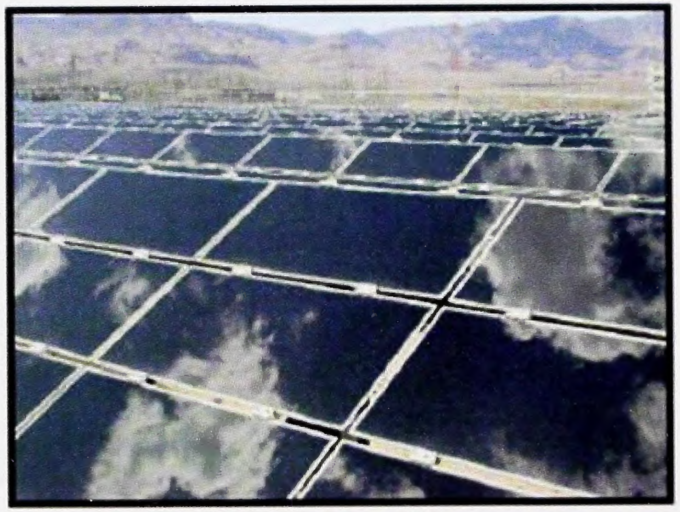
Stirling Dish

U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: Sunray Energy, Inc., SolarOne website, Stirling Energy Systems website

Figure 3-21
ISEGS – Linear Fresnel and Photovoltaic Technologies



Linear Fresnel Technology



First Solar's thin film solar photovoltaic field

Canon Solar Partners proposes to use the 35 kW Amonix System

SunPower's PowerTracker Solar in Gwangju City Power Plant, South Korea - 1 MW

U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: Wikipedia.org, Fresnel_reflectors_ausra.jpg, www.optisolar.com/topaz.htm, Canon 2008, www.sunpowercorp.com/For-Power-Plants.aspx

4.0 Affected Environment and Environmental Consequences

This section evaluates the impacts of the proposed project and alternatives on the environment in 19 individual resource areas. For each resource, this section identifies the potentially affected resources, evaluates the potential environmental impacts associated with each alternative, and identifies mitigation measures that may avoid or minimize the impacts.

Mitigation Measures Included in the Analysis

For impacts identified in the following resource sections, mitigation measures have been developed that would be implemented during all appropriate phases of the project from initial ground breaking, to operations, and through closure and decommissioning. The mitigation measures include a combination of the following:

- Measures that have been proposed by the applicant;
- Conditions of Certification proposed by the California Energy Commission;
- Regulatory requirements of other federal, state, and local agencies;
- USFWS terms and conditions identified in the Biological Opinion; and
- Additional BLM-proposed mitigation measures and standard ROW grant terms and conditions.

These requirements are generically referred to as "mitigation measures" throughout this FEIS. Because these mitigation measures are derived from a variety of sources, they also are required, and their implementation regulated, by the various agencies. For instance, the mitigation measures proposed by the applicant have been accepted by the BLM and the CEC and have been incorporated into the project description. This, in turn, is the project description that has been presented to the USFWS for consultation and is the project description upon which the terms and conditions of the Biological Opinion are based. The project applicant is required to comply with the terms and conditions of the Biological Opinion.

Many of the other mitigation measures are required by agencies other than the BLM, and the applicant's compliance with those measures would be regulated by those other agencies. For instance, air quality measures AQ-1 through AQ-11 are measures that are applicable to Ivanpah 1 and Ivanpah 2 boilers contained in the Mojave Desert Air Quality Management District's permit. The project applicant will be required by the ROD and the ROW grant to comply with the requirements of those other agencies (see, e.g., 43 CFR 2805.12(a) (Federal and state laws and regulations), (i)(6) (more stringent state standards for public health and safety, environmental protection and siting, constructing, operating, and maintaining any facilities and improvements on the ROW). Any non-compliance with implementation of these other Federal or state requirements may impact BLM's decision to issue a ROD or approve any ROW grant.

As noted above, the BLM recognizes that the Energy Commission Conditions of Certification are not generally within the enforcement authority of the BLM, since those

Conditions are requirements originating in State law and regulation. While the project applicant must comply with these measures, they are not directly enforceable by the BLM except in the general sense referred to above. For those Conditions that are also within the enforcement authority of the BLM because of overlapping authorities, the BLM would incorporate those Conditions into any ROW grant as its own terms and conditions subject to its enforcement authority. **Table 4.0-1** contains a list of Conditions and denotes those measures that would be monitored and managed by the Energy Commission, and those that would be subject to joint administration between the BLM and CEC.

In some instances, the BLM identified potential impacts to public land resources that would not be and have not been identified as mitigation measures required by these other agencies, including the Energy Commission. In these instances, individual mitigation measures have been developed by the BLM and these measures would be incorporated into any ROW grant, and would be monitored and managed solely by the BLM. These measures are also identified in **Table 4.0-1**. In addition, standard terms and conditions for approval of the use of public land will be identified in the ROD and incorporated into the proposed ROW grant and therefore will be enforced by the BLM as part of any ROW grant approved for the project. These standard terms and conditions are discussed below, and specified in Section 7 of this EIS.

Terms and Conditions Found in FLPMA and BLM ROW Regulations

Title V of the Federal Land Policy and Management Act of 1976 addresses the issuance of ROW authorizations on public land. The BLM has identified all the lands that would be occupied by facilities associated with the ISEGS project that are needed for construction, operation, and maintenance of the project. The general terms and conditions for all public land rights of way are described in FLPMA section 505, and include measures to minimize damage and otherwise protect the environment, require compliance with air and water quality standards, and compliance with more stringent state standards for public health and safety, environmental protection, siting, construction, operation, and maintenance of ROWs. The Secretary may prescribe additional terms and conditions as s/he deems necessary to protect Federal property, provide for efficient management, and among other things, generally protect the public interest in the public lands subject to or lands adjacent thereto. For this project, terms and conditions that are necessary to protect public safety, including security fencing and on-site personnel, have been incorporated into the right-of-way grant. The environmental consequences analysis in the EIS identifies impacts and mitigation measures to reduce and eliminate impacts. The mitigation measures identified by the BLM and incorporated as a term and condition of the ROW grant provide those actions necessary to prevent unnecessary or undue degradation of the public lands as required by FLPMA section 302. The additional mitigation measures that are identified and described in the EIS and that will be enforced by the other agencies, as noted above, provide additional protection to public land resources.

Specifically, the FEIS identifies mitigation measures that would:

1. Require compliance with Mojave Desert Air Quality Management District and State regulations, reduce carbon emissions, and minimize dust;

2. Require planning and compliance with Federal, State and local agency requirements for Drainage, Erosion and Sediment Control, wastewater management, groundwater use and monitoring, and stormwater control and monitoring;
3. Require measures to protect public health and safety including traffic control, transmission line standards, hazardous materials and waste management, and worker safety plans; and
4. Require biological resource mitigation and cultural resources mitigation to protect sensitive environmental resources and cause the least damage to the environment and protect the public interest, while allowing the project to be constructed.

Finally, all BLM right-of-way grants are approved subject to regulations contained at 43 CFR 2800. Those regulations specify that the BLM may, at any time, change the terms and conditions of a right-of-way grant “as a result of changes in legislation, regulations, or as otherwise necessary to protect public health or safety or the environment.” 43 CFR 2805.15(e).

The BLM will monitor conditions and review any ROW grant issued for the ISEGS facility to evaluate if future changes to the grant terms and conditions are necessary or justified under this provision of the regulations to further minimize or reduce impacts resulting from the project.

If approved, the solar energy right-of-way authorization will include diligent development terms and conditions, consistent with the requirements of 43 CFR 2805.12(i)(5). Failure of the holder to comply with the diligent development terms and conditions provides the BLM authorized officer the authority to suspend or terminate the authorization (43 CFR 2807.17).

If approved the solar energy right-of-way authorization will include a required “Performance and Reclamation” bond to ensure compliance with the terms and conditions of the right-of-way authorization, consistent with the requirements of 43 CFR 2805.12(g). The “Performance and Reclamation” bond will consist of three components. The first component will be hazardous materials, the second component will be the decommissioning and removal of improvements and facilities and the third component will address reclamation, revegetation, restoration and soil stabilization.

Table 4.0-1
Summary of Mitigation Measures

Condition	Summary	CEC	BLM	Comment
Air Quality				
AQ-SC1	Designate an Air Quality Construction Mitigation Manager	X		Component of monitoring to be managed by CEC
AQ-SC2	Develop an Air Quality Construction Mitigation Plan	X		Component of monitoring to be managed by CEC
AQ-SC3	Fugitive Dust Control Plan for Construction	X		Component of monitoring to be managed by CEC
AQ-SC4	Monitoring and Response to Dust Plumes	X		Component of monitoring to be managed by CEC
AQ-SC5	Diesel-Fueled Engine Control	X		CEC-specific requirement
AQ-SC6	New Model Year Vehicles for maintenance and mirror washing	X		CEC-specific requirement
AQ-SC7	Fugitive Dust Control Plan for Operations	X		Component of monitoring to be managed by CEC
AQ-SC8	Provide copies of Authority-to-Construct (ATC) and Permit-to-Operate (PTO)	X		CEC-specific requirement
AQ-SC9	Follow emissions standards for emergency generator and fire pump engines	X		CEC-specific requirement
AQ-SC10	Limit natural gas burning to 5 percent of total annual heat input	X		Component of monitoring to be managed by CEC
AQ-1 through AQ-39	MDAQMD permit requirements for boilers for proposed project	X		Other state regulation (MDAQMD)
AQ-1 through AQ-30	MDAQMD permit requirements for boilers for Mitigated Ivanpah 3 Alternative	X		Other state regulation (MDAQMD)
Greenhouse Gases				
None				
Biological Resources				
BIO-1	Designated Biologist selection and qualification	X		Component of monitoring to be managed by CEC
BIO-2	Designated Biologist duties	X		Component of monitoring to be managed by CEC
BIO-3	Biological Monitor selection and qualifications	X		Component of monitoring to be managed by CEC
BIO-4	Biological Monitor duties	X		Component of monitoring to be managed by CEC

Condition	Summary	CEC	BLM	Comment
BIO-5	Designated Biologist and Biological Monitor Authority	X		Component of monitoring to be managed by CEC
BIO-6	Worker Environmental Awareness Program	X		Component of monitoring to be managed by CEC
BIO-7	Biological Resources Mitigation Implementation and Monitoring Plan	X		Component of monitoring to be managed by CEC
BIO-8	Desert Tortoise Clearance Surveys and fencing	X	X	
BIO-9	Desert Tortoise Translocation Plan	X	X	
BIO-10	Desert Tortoise Compliance Verification	X		Component of monitoring to be managed by CEC
BIO-11	Impact Avoidance and Mitigation Measures	X		Component of monitoring to be managed by CEC
BIO-12	Raven Management Plan	X	X	
BIO-13	Weed Management Plan	X	X	
BIO-14	Closure, Revegetation, and Rehabilitation Plan	X	X	
BIO-15	Pre-Construction Nest Surveys	X		Component of monitoring to be managed by CEC
BIO-16	Burrowing Owl Impact Avoidance and Minimization Measures	X		Component of monitoring to be managed by CEC
BIO-17	Desert Tortoise Compensatory Mitigation	X	X	
BIO-18	Special-Status Plant Impact Avoidance and Minimization	X		CEC-specific requirement
BIO-19	Nelson's Bighorn Sheep Mitigation	X		Component of monitoring to be managed by CEC
BIO-20	Streambed Impact Minimization and Compensation Measures	X		Other state regulation (CDFG)
BIO-21	Provide information on special-status plant species, and conduct surveys as directed by BLM		X	Identified by BLM after CEC hearing process was completed.
BIO-22	Prepare MBTA Conservation Agreement in coordination with USFWS, BLM, and CDFG		X	Identified by BLM after CEC hearing process was completed.
BIO-23	Conduct bi-weekly surveys for bird and bat mortailities		X	Identified by BLM after CEC hearing process was completed.
BIO-24	Avoid using barbed wire on northern boundary fence to minimize impacts to sheep		X	Identified by BLM after CEC hearing process was completed.
BIO-25	Monitor and control noxious weeds near artificial water source		X	Identified by BLM after CEC hearing process was completed
BIO-26	Implement all mitigation identified by USFWS in the Biological Opinion		X	Identified by BLM after CEC hearing process was completed.
BIO-27	Implement July 2010 Closure Plan, with modifications		X	Identified by BLM after CEC hearing process

Condition	Summary	CEC	BLM	Comment
				was completed.
BIO-28	Golden Eagle protection		X	Identified by BLM after CEC hearing process was completed.
Cultural Resources				
CUL-1	Designate Cultural Resources Specialist (CRS) and Cultural Resources Monitors (CRMs)	X		Component of monitoring to be managed by CEC
CUL-2	Provide CRS with copies of AFC, Data Responses, maps, and confidential cultural resources reports	X		Component of monitoring to be managed by CEC
CUL-3	Cultural Resources Monitoring and Mitigation Plan (CRMMP)	X		Component of monitoring to be managed by CEC
CUL-4	Submit Cultural Resources Report (CRR)	X		Component of monitoring to be managed by CEC
CUL-5	Worker Environmental Awareness Program	X		Component of monitoring to be managed by CEC
CUL-6	Halt work upon discovery of buried archaeological materials	X		Component of monitoring to be managed by CEC
CUL-7	Further monitoring following discovery	X		Component of monitoring to be managed by CEC
CUL-8	Documentation of Hoover Dam-to-San Bernardino transmission line	X	X	
CUL-9	Development of HAER-type documentation for Hoover Dam-to-San Bernardino transmission line	X	X	
CUL-10	Cultural resources surveys for borrow and fill areas	X		Component of monitoring to be managed by CEC
Hazardous Materials Management				
HAZ-1	Hazardous materials use limited to types and quantities provided in Appendix B - Hazardous Materials	X		Component of monitoring to be managed by CEC
HAZ-2	Provide Hazardous Materials Business Plan to San Bernardino County Fire Department	X		Other state regulation (County)
HAZ-3	Safety Management Plan for delivery of liquid hazardous materials	X		Other state regulation
HAZ-4	Construction Site Security Plan	X		Other state regulation
HAZ-5	Operation Site Security plan	X		Other state regulation
HAZ-6	Comply with federal and state laws and regulations		X	BLM standard term and condition
Land Use				
LAND-1	Obtain ROW grant from BLM	X		Component of monitoring to be managed by CEC
LAND-2	Provide minimum 20 feet setback between security/tortoise	X		Component of monitoring to be managed by

Condition	Summary	CEC	BLM	Comment
	fence and ROW boundary to allow for maintenance			CEC
Noise and Vibration				
NOISE-1	Notify Primm Valley Golf Course of commencement of construction	X		Component of monitoring to be managed by CEC
NOISE-2	Noise Complaint Process	X		Component of monitoring to be managed by CEC
NOISE-3	Noise Control Program	X		Component of monitoring to be managed by CEC
NOISE-4	Noise level restrictions	X		Component of monitoring to be managed by CEC
NOISE-5	Noise Hazard Surveys	X		Component of monitoring to be managed by CEC
NOISE-6	Construction time restrictions	X		Component of monitoring to be managed by CEC
NOISE-7	Steam blow restrictions	X		Component of monitoring to be managed by CEC
Public Health and Safety				
None				
Socioeconomics				
None				
Soil and Water Resources				
Soil&Water-1	Drainage, Erosion, and Sedimentation Control Plan	X		Other state regulation (Water Board)
Soil&Water-2	Water Discharge Requirements	X		Other state regulation (Water Board)
Soil&Water-3	Groundwater well construction and documentation	X		Other local regulation (County)
Soil&Water-4	Construction and Operations Water Use	X	X	
Soil&Water-5	Stormwater Damage Monitoring and Response Plan	X	X	
Soil&Water-6	Groundwater Level Monitoring and Reporting Plan	X	X	
Soil&Water-7	Wastewater Collection System requirements	X		Other state regulation (Water Board)
Soil&Water-8	Septic and Leach Field requirements	X		Other state regulation (Water Board)
Traffic and Transportation				
TRANS-1	Traffic Control Plan	X		Component of monitoring to be managed by CEC
TRANS-2	Repair of Public Right-of-Way	X		Component of monitoring to be managed by CEC
TRANS-3	Heliostat Positioning Plan and Monitoring	X		Component of monitoring to be managed by CEC
TRANS-4	Verification of Power Tower Receiver Luminance and Monitoring	X	X	

Condition	Summary	CEC	BLM	Comment
TRANS-5	Power Tower Lighting	X		Other Federal requirement (FAA)
TRANS-6	FAA Notification	X		Other Federal requirement (FAA)
Transmission Line Safety and Nuisance				
TLSN-1	Construct tie lines according to CPUC regulations	X		Other state regulation (CPUC)
TLSN-2	Measure electric and magnetic fields	X		Other state regulation (CPUC)
TLSN-3	Keep area under tie lines free of combustible material	X		Other state regulation (CPUC)
TLSN-4	Ensure that all permanent metal objects under tie lines are grounded	X		Other state regulation (CPUC)
Visual Resources				
VIS-1	Surface treatment of project structures and buildings	X		Component of monitoring to be managed by CEC
VIS-2	Landscape screening of golf course	X		Component of monitoring to be managed by CEC
VIS-3	Revegetation of disturbed soil areas	X		Component of monitoring to be managed by CEC
VIS-4	Temporary and Permanent Exterior Lighting	X		Component of monitoring to be managed by CEC
Waste Management				
WASTE-1	Identification of Professional Engineer or Geologist to oversee soil disturbance	X		Other state regulation (DTSC)
WASTE-2	Identification and management of contaminated soils	X		Other state regulation (DTSC)
WASTE-3	Construction Waste Management Plan	X		Component of monitoring to be managed by CEC
WASTE-4	Hazardous Waste Generator Identification Number	X		Other Federal requirement (EPA)
WASTE-5	Notify agency of impending waste management-related enforcement action by local, state, or federal authorities	X		Other regulation (various)
WASTE-6	Operation Waste Management Plan	X		Component of monitoring to be managed by CEC
WASTE-7	Address releases of hazardous materials in accordance with applicable regulations	X		Other regulation (various)
Worker Safety				
Worker Safety-1	Project Construction Safety and Health Program	X		Component of monitoring to be managed by CEC
Worker Safety-2	Project Operations and Maintenance Safety and Health Program	X		Component of monitoring to be managed by CEC
Worker Safety-3	Designate Construction Safety Supervisor	X		Component of monitoring to be managed by CEC
Worker Safety-	Make payments to the Chief Building Officer for services of a	X		Component of monitoring to be managed by

Condition	Summary	CEC	BLM	Comment
4	Safety Monitor			CEC
Worker Safety-5	Portable Automatic External Defibrillator	X		CEC-specific requirement
Worker Safety-6	Follow Best Management Practices for storage and application of herbicides	X		Component of monitoring to be managed by CEC
Geology, Paleontology, and Minerals				
GEO-1	Specifications for Soils Engineering Report	X		Component of monitoring to be managed by CEC
PAL-1	Designate Paleontological Resources Specialist (PRS) and Monitors	X		Component of monitoring to be managed by CEC
PAL-2	Provide maps and drawings to the PRS	X		Component of monitoring to be managed by CEC
PAL-3	Develop Paleontological Resources Monitoring and Mitigation Plan (PRMMP), if directed by PRS	X		Component of monitoring to be managed by CEC
PAL-4	Worker Environmental Awareness Program, and Conduct weekly training, if required by PRS	X		Component of monitoring to be managed by CEC
PAL-5	Monitor in areas on grading, excavation, trenching, and augering	X		Component of monitoring to be managed by CEC
PAL-6	Collect fossil materials in accordance with PRMMP	X		Component of monitoring to be managed by CEC
PAL-7	Develop Paleontological Resources Report	X		Component of monitoring to be managed by CEC
Livestock Grazing				
None				
Wild Horses and Burros				
None				
Recreation				
REC-1	Develop Solar/Ecological Interpretive Center	X		CEC-specific requirement
REC-2	Allow public access to redirected trails		X	BLM-specific requirement

4.1 Air Quality

Introduction

This analysis evaluates the expected air quality impacts from the emissions of criteria air pollutants from both the construction and operation of the ISEGS project. Criteria air pollutants are defined as air contaminants for which the state and/or federal governments have established an ambient air quality standard to protect public health.

The criteria pollutants analyzed are nitrogen dioxide (NO_2), sulfur dioxide (SO_2), CO, ozone (O_3), and particulate matter (PM). Lead is not analyzed as a criteria pollutant, but lead and other toxic air pollutant emissions impacts are analyzed in Section 4.8. Two subsets of particulate matter are inhalable particulate matter (less than 10 microns in diameter, or PM10) and fine particulate matter (less than 2.5 microns in diameter, or PM2.5). NOx (consisting primarily of nitric oxide [NO] and NO_2) and VOC emissions readily react in the atmosphere as precursors to ozone and, to a lesser extent, particulate matter. Sulfur oxides (SOx) readily react in the atmosphere to form particulate matter and are major contributors to acid rain. Global climate change and greenhouse gas (GHG) emissions from the project are discussed in Section 4.2.

In carrying out this analysis, BLM evaluated the following four major issues:

- whether the ISEGS project is likely to conform with applicable federal, state, and Mojave Desert Air Quality Management District (District) air quality laws, ordinances, regulations and standards;
- whether the ISEGS project is likely to cause new violations of ambient air quality standards or contribute substantially to existing violations of those standards;
- whether mitigation measures proposed for the project would be effective in avoiding or reducing potential impacts.
- whether the ISEGS project would exceed NEPA air quality analysis thresholds, before or after implementation of mitigation measures.

Resource-Specific Project Description

Project Emissions Sources

The proposed 400-MW project includes three solar concentrating thermal power plants, based on distributed power tower and heliostat mirror technology, in which heliostat (mirror) fields focus solar energy on power tower receivers near the center of each heliostat array. ISEGS 1 and 2, are designed to provide 100 MW of electricity and would occupy approximately 914 acres and 921 acres respectively; the 200-MW phase, ISEGS 3, would require occupy approximately 1,843 acres. All three phases would share an administration building, an operation and maintenance building, and a substation. Another 316 acres is needed for construction staging activities. Established dirt roads account for an additional five acres. ISEGS total project footprint amounts to approximately 4,065 acres (approximately 6.4 square miles).

Each plant includes a natural gas-fired steam boiler equipped with a low-NOx burner/air recirculation system to maintain NOx emissions below 9 ppm. These boilers provide thermal input to the turbine during the morning start-up cycle and during transient cloudy conditions. The operation of these boilers would not exceed four hours each day and 5 percent of the facility annual's heat input from the sun. To provide fuel to these new boilers, natural gas would be supplied to the site through a new, proposed six-mile long distribution pipeline ranging from 4 to 6 inches in diameter. From the Kern River Gas Transmission pipeline, the pipeline would extend 0.5 miles south to the northern edge of Ivanpah 3. From ISEGS 3, a supply line would extend northwest into the Ivanpah 3 power block. The main pipeline would continue along the eastern edge of Ivanpah 2 to another metering station at its southeastern corner. Again, a branch supply line would extend northwestwards into the center of the Ivanpah 2 power block. From that station, the pipeline would follow the paved access road from Colosseum Road past the administration/warehouse building to the Ivanpah 1 power block. Project steam cycle cooling needs would be provided by air cooled condensers (ACCs) at each of the three plants, which will minimize water use substantially. The applicant is currently proposing the use of groundwater from wells just east of Ivanpah 2, which will be stored in tanks with underground pipelines constructed to connect to the three plants. Process wastewater will treated onsite and recycled for use at each of the three plants, and domestic wastewater will be disposed in a septic tank and an onsite leach field. Therefore, no industrial wastewater or sewer pipeline is proposed to be constructed.

The project would include other operating emission sources for operation and maintenance of the facility. Each plant also includes a diesel-fired 240-horsepower (hp) fire pump engine (3 total at the site) and a 3,750-hp emergency generator engine, with ISEGS 3 having two emergency generator engines (4 total at the site). Additionally, it is proposed that the facility have tractor pulled mirror washing trailers and dedicated pickup trucks for personnel transport within the plants, which will create both tailpipe and fugitive dust emissions during operation.

Construction Emissions

Construction of each of the three phases of the facility would last about 24 months, with a 12 month overlap between each phase. Thus, the construction of the entire facility would last up to four years. The construction is scheduled in the order of the plant number, and the construction of the gas pipeline is scheduled to occur during months 7 and 8 of ISEGS 1 construction.

Table 4.1-1 presents the applicant's estimate of direct onsite and offsite (delivery and employee vehicle) construction emissions for NOx, VOC, SOx, CO, PM10 and PM2.5.

Table 4.1-1
ISEGS Construction Emissions

Solar Facility Construction	Daily Emissions (lbs/day) [a]					
	NOx	**SOx**	**CO**	**VOC**	**PM10**	**PM2.5**
Maximum Daily Onsite Emissions	363	1	117	23	199	46
Maximum Daily Offsite Emissions	137	1	392	40	86	16
Maximum Daily Emissions	500	2	509	63	285	63
	Annual Emissions (tons/year) [a]					
Maximum Annual Onsite Emissions	29.9	0.1	9.9	2.0	18.5	4.3
Maximum Annual Offsite Emissions	11.4	0.1	34.3	3.5	6.0	1.5
Maximum Annual Emissions	41.3	0.2	44.2	5.4	24.5	5.8

Source: AFC (CH2M Hill 2007), and Data Responses (CH2M Hill 2008f).
Notes:
a. Emissions include fugitive dust.

The emission estimate appears reasonable in terms of the onsite equipment and offsite vehicle use and the offsite vehicle fugitive dust emissions. However, the onsite fugitive dust emissions estimate may be underestimated given the amount of activity on the site and appropriate level of control for the applicant's proposed mitigation measures (specifically watering unpaved roads). Additional mitigation measures, **AQ-SC3** and **AQ-SC4**, which require the use of soil binders on unpaved roads and other inactive disturbed surfaces during construction, would ensure that the applicant's fugitive dust emissions estimate and associated impact analysis are reasonable for this project.

The emission values in **Table 4.1-1** include incorporation of the fugitive dust mitigation measures. The unmitigated PM10 annual emission potential during construction would potentially be greater than 100 tons per year, so without mitigation the annual PM10 emissions would have the potential to exceed General Conformity applicability thresholds and the project would require a formal conformity determination as per the federal Clean Air Act (CAA) General Conformity Rule.

Operations Emissions

The ISEGS facility would be a nominal 400 MW heliostat mirror and power tower thermal solar electrical generating facility comprised of three plants, ISEGS 1 (100 MW), ISEGS 2 (100 MW) and ISEGS 3 (200 MW) (CH2M Hill 2007). The direct air pollutant emissions from solar power generation are minimal; however, the facility will start-up each day with the assistance of one large boiler associated with each plant and there are other auxiliary equipment and maintenance activities necessary to operate and maintain the facility.

The ISEGS onsite stationary and mobile emission sources are as follows:

- Three natural gas fueled boilers, two 231.1 MMBtu/hr boilers (ISEGS 1 and ISEGS 2), and one 462.2 MMBtu/hr boiler (ISEGS 3) used for daily startup, each limited to no more than 4 hours of use per day and no more than 1,460 hours of use per year;

- Three 240-bhp diesel-fired emergency fire water pump engines, one for each plant, that will operate in non-emergency mode no more than 50 hours per year or no more than required by National Fire Protection Association, whichever is greater;
- Four 3,750-bhp diesel-fired emergency generator engines fire water pump engines, one each for ISEGS 1 and 2, and two for ISEGS 3 that will operate in non-emergency mode no more than 50 hours per year;
- Onsite diesel and gasoline fueled maintenance vehicles used for mirror washing and other maintenance/operation support activities.

The following assumptions were used to develop the hourly, daily, and annual emissions estimate for ISEGS operation:

- Maximum Hourly Emissions
- All boilers are operating.
- One emergency generator engine operates one-half hour for testing purposes.
- The maximum hourly use of the maintenance vehicles is 1/2000th the annual use, which is 60 miles for the heavy-duty mirror washing vehicles and 15 miles for the pickup trucks.
- 25 employees are traveling 50 mile one-way trip to/from the site and one heavy-duty delivery vehicle is traveling 50 mile one-way to/from the site during the hour.

B. Maximum Daily Emissions

- All boilers operate for 4 hours per day.
- All four emergency generator engines operate one hour each for testing purposes.
- All three emergency fire pump engines operate one hour each for testing purposes.
- The maximum daily use of the maintenance vehicles is 1/250th the annual use, which is 480 miles for the heavy duty mirror washing vehicles and 120 miles for the pickup trucks.
- 66 employees traveling 100 mile round trips to/from the site during the day and three heavy-duty delivery vehicle travel 100 mile round trips to/from the site during the day.

C. Maximum Annual Emissions

- All boilers operate for 1,460 hours per year.
- All four emergency generator engines operate 50 hours per year for testing purposes.
- All three emergency fire pump engines operate 50 hours per year for testing purposes.

- The heavy duty mirror washing vehicles travel 120,000 miles per year and the on-site pickup trucks travel 30,000 miles per year.
- There is a total of 2.34 million employee vehicle miles traveled and a total of 12,000 heavy-duty delivery vehicle miles traveled annually.

The ISEGS onsite stationary source, onsite mobile equipment, and offsite vehicle emissions, including fugitive PM10 emissions, are estimated and summarized in **Table 4.1-2**.

Table 4.1-2
ISEGS Operation - Maximum Hourly, Maximum Daily, and Annual Emissions

	Maximum Hourly Emissions (lbs/hr)					
Emission Source	**NOx**	**SOx**	**CO**	**VOC**	**PM10**	**PM2.5**
Boilers	10.00	2.50	16.90	4.90	6.80	6.80
Emergency Generator Engines	19.43	0.02	10.75	0.41	0.62	0.57
Emergency Fire Pump Engines	0.00	0.00	0.00	0.00	0.00	0.00
Maintenance Vehicles (all types)	2.32	0.02	1.48	0.18	14.60	3.13
Employee and Delivery Vehicles (offsite)	3.62	0.03	19.15	1.88	1.40	0.37
Total Maximum Hourly Emissions	35.38	2.57	48.28	7.38	23.41	10.87
Emission Source	**Maximum Daily Emissions (lbs/day)**					
Boilers	40.0	10.0	67.6	19.6	27.2	27.2
Emergency Generator Engines	77.7	0.1	43.0	1.7	2.5	2.3
Emergency Fire Pump Engines	4.6	0.0	4.1	0.2	0.2	0.2
Maintenance Vehicles (all types)	18.6	0.2	11.9	1.4	116.8	25.0
Employee and Delivery Vehicles (offsite)	20.5	0.2	101.9	10.0	7.4	2.0
Total Maximum Daily Emissions	161.4	10.4	228.4	32.9	154.1	56.7
Emission Source	**Annual Emissions (tons/year) [a]**					
Boilers	7.3	1.8	12.3	3.6	5.0	5.0
Emergency Generator Engines	3.9	0.0	2.1	0.1	0.1	0.1
Emergency Fire Pump Engines	0.1	0.0	0.1	0.0	0.0	0.0
Maintenance Vehicles (all types)	2.3	0.0	1.5	0.2	14.6	3.1
Employee and Delivery Vehicles (offsite)	1.8	0.0	17.1	1.7	1.2	0.3
Total Annual Emissions	15.4	1.9	33.1	5.5	20.9	8.5

Source: CH2M Hill 2007, CH2M Hill 2008g, Tier II and Tier III maximum emissions for the engines and staff estimates of paved road dust emissions for the employee and delivery vehicles.
Note:
a The annual emissions are based on permit limits, but the actual annual boiler use and annual emissions are expected to be less than a third of the permit limits.

Similar to the construction emissions estimate, the onsite fugitive dust emissions estimate may be underestimated given the amount of activity on the site and appropriate level of control for the applicant's proposed mitigation measures (specifically watering unpaved roads). Additional mitigation measure, **AQ-SC7**, would requires the use of soil binders on unpaved roads and other inactive disturbed surfaces during site operation, so that the applicant's fugitive dust emissions estimate and associated impact analysis are reasonable for this project.

The emission values in **Table 4.1-2** include incorporation of the fugitive dust mitigation measures. The unmitigated PM10 annual emission potential during operation would potentially be greater than 100 tons per year, so without mitigation the annual PM10

emissions would have the potential to exceed General Conformity applicability thresholds and the project would require a formal conformity determination as per the CAA General Conformity Rule.

The direct stationary source emissions from this project are well below the Prevention of Significant Deterioration (PSD) and/or nonattainment NSR permitting applicability thresholds; therefore, the facility is considered a minor stationary source and likely would not result in any direct, adverse NEPA impacts.

Project Construction and Operation Overlap

For a period of time, the construction and operation of the facilities will overlap due to the staged construction and operation of the three plants. The applicant estimated the maximum overlapping emissions when ISEGS 1 is operating and ISEGS 2 is in construction and when ISEGS 1 and 2 are operating and ISEGS 3 is in construction. **Table 4.1-3** presents the determined worst-case overlapping construction and operation emissions, which occur when operating ISEGS 1 and 2 and constructing ISEGS 3.

Table 4.1-3
ISEGS Maximum Construction and Operations Overlap Emissions

	NOx	SOx	CO	VOC	PM10	PM2.5
Solar Facility Construction	**Hourly Emissions (lbs/hour) [a]**					
Construction Onsite Emissions	36.3	0.1	11.7	2.3	19.9	4.6
Construction Offsite Emissions	13.7	0.1	39.2	4.0	8.6	1.6
Solar Facility Operation						
Operation Onsite Emissions	26.0	1.3	20.2	3.0	13.8	6.1
Operation Offsite Emissions	2.4	0.0	12.8	1.3	0.9	0.2
Maximum Hourly Overlap Emissions	78.4	1.5	83.9	10.6	43.2	12.5
Solar Facility Construction	**Daily Emissions (lbs/day) [a]**					
Construction Onsite Emissions	363.4	1.0	116.7	23.0	199.2	46.3
Construction Offsite Emissions	136.9	1.3	392.3	39.7	85.9	16.5
Solar Facility Operation						
Operation Onsite Emissions	74.3	5.2	66.0	11.7	92.9	31.6
Operation Offsite Emissions	13.7	0.1	67.9	6.7	4.9	1.3
Maximum Daily Overlap Emissions	588.3	7.6	642.9	81.1	382.9	95.7
Solar Facility Construction	**Annual Emissions (tons/year) [a]**					
Construction Onsite Emissions	29.9	0.1	9.9	2.0	18.5	4.3
Construction Offsite Emissions	11.4	0.1	34.3	3.5	6.0	1.5
Solar Facility Operation						
Operation Onsite Emissions	7.2	0.9	8.3	2.0	12.3	4.6
Operation Offsite Emissions	1.2	0.0	11.4	1.1	0.8	0.2
Maximum Annual Emissions	49.7	1.1	63.9	8.6	37.6	10.6

Source: Data Responses (CH2M Hill 2008f) and staff's assessment of offsite emissions.
Note:
a. Emissions include fugitive dust and construction emissions are based on a 10-hour construction day.

The applicant modeled the onsite emissions shown above for the operation of ISEGS 1 and 2 and the construction of ISEGS 3, as well as the worst-case onsite emissions

associated with operation of ISEGS 1 and construction of ISEGS 2 to determine the estimated worst-case impacts during project construction and partial operation overlap.

Initial Commissioning

Initial commissioning refers to a period of approximately 60 days prior to beginning commercial operation when the equipment undergoes initial tuning and performance tests. BLM does not expect substantial change of emissions from the facility commissioning to that of full production.

Air Emissions Associated with Alternative Configuration

In the Mitigated Ivanpah 3 and Modified I-15 Alternatives, the basic conceptual design for the overall project remains the same. The overall project comprises three solar concentrating thermal power plants (Ivanpah 1, 2 and 3 –Ivanpah 1, Ivanpah 2 and Ivanpah 3) based on power tower and heliostat mirror technology, in which heliostat (mirror) fields would focus solar energy on power tower receivers near the center of each heliostat field. The power tower receivers would absorb the reflected solar energy and generate steam which would be used in conventional steam turbine generators to produce electricity. Each plant would include a natural gas-fired steam boiler to provide thermal input to the steam turbine during the morning start-up cycle and during transient cloudy conditions. ACCs at each of the three plants would provide steam cycle cooling.

The alternatives would include other operating emission sources for operation and maintenance of the facility. Each plant would include a diesel-fired fire pump engine (3 total for the project) and an emergency generator engine. In the proposed project, Ivanpah Unit 3 was proposed with two emergency generator engines for a total of four emergency generators for the project. The Mitigated Ivanpah 3 and Modified I-15 Alternatives would eliminate one of the Ivanpah 3 emergency generators. The alternatives would use a mirror washing machine and dedicated pickup trucks for personnel transport within the plants, which would produce both tailpipe and fugitive dust emissions during operation.

The changes in the project scope in the Mitigated Ivanpah 3 and Modified I-15 Alternatives associated with air quality include:

- Eliminate approximately 40,000 heliostats from the heliostat field for Ivanpah 3 to reduce the acreage for the Ivanpah 3 heliostat field by approximately 430 acres. This reduces the project total for the heliostats from approximately 213,500 to 173,500;
- Move the northern boundary for the Ivanpah 3 heliostat field southward and move the power block for Ivanpah 3 southward to the center of the smaller Ivanpah 3 heliostat field.
- Reduce the number of power towers for Ivanpah 3 from five to one. This reduces the number of power towers for the entire project from seven to three;
- Reduce the size of the Ivanpah 3 auxiliary boiler by half to match the size of the Ivanpah 1 and Ivanpah 2 auxiliary boilers;

- Resize the steam turbine generators from the original 100MW, 100MW and 200MW for Ivanpah 1, Ivanpah 2 and Ivanpah 3 respectively to 120MW, 125MW and 125MW respectively, reducing facility total generation capacity from 400MW to 370MW;
- Reduce the number of emergency generators for Ivanpah 3 from two to one;
- Realign some of the heliostats originally allocated to Ivanpah 3 to serve the Ivanpah 2 power tower and move the boundary between the Ivanpah 2 and Ivanpah 3 heliostat fields northward; and
- Realign some roads and utilities within the project footprint.

Even though the alternatives would include the installation of larger steam turbine generators for the Ivanpah 1 and Ivanpah 2 plants, there would be no proposed changes in the location, configuration, or the short-term hours of operation or fuel usage for the emitting sources in the Ivanpah 1 and Ivanpah 2 power plants. This means there would be no changes in the short-term quantity or timing of emissions from these sources and thus no changes in the estimated short-term air quality impacts resulting from the operation of these sources. Thus, for the short-term averaging periods, the operations emissions for the Ivanpah 1 and Ivanpah 2 power plant for the Mitigated Ivanpah 3 and Modified I-15 Alternatives would be "within the envelope" of emissions and air quality impacts for the Ivanpah 1 and Ivanpah 2 sources analyzed for the proposed project.

On an annual basis, the only potential changes would involve the auxiliary boilers. For the envelope analysis, BLM assumes that the annual solar energy input is directly proportional to the number of heliostats for each unit. The alternatives would reduce the number of heliostats for Ivanpah 1 (55,000 to 53,500). Thus, the annual emissions and associated annual air quality impacts for Ivanpah 1 for the Mitigated Ivanpah 3 and Modified I-15 Alternatives would be "within the envelope" of the emissions and air quality impacts for Ivanpah 1 analyzed for the proposed project. For Ivanpah 2, the alternatives would increase the number of heliostats by approximately 9% from 55,000 to 60,000. The estimated annual average impacts for the auxiliary boilers were reviewed and BLM determined that a 9% increase in the contribution from the Ivanpah 2 auxiliary boiler the annual averages would be so small that this change would be lost in the rounding.

For Ivanpah 3, the features of the Mitigated Ivanpah 3 and Modified I-15 Alternatives that impact operations emissions and which were evaluated in this analysis are:

- 50% reduction in the capacity and fuel usage (hourly, daily and annual) for the Ivanpah 3 auxiliary boiler,
- Elimination of one of the emergency generators for Ivanpah 3, and
- Relocation of the Ivanpah 3 power block, including the three emissions sources (auxiliary boiler, emergency generator and diesel engine fire pump) southward to the center of the reconfigured Ivanpah 3 heliostat field.

Applicable Laws, Regulations, and Supplemental Authorities

The federal, state, and local laws and policies applicable to the control of criteria pollutant emissions and mitigation of air quality impacts for the ISEGS are summarized in **Table 4.1-4**. BLM's analysis examines the project's compliance with these requirements.

Table 4.1-4
Applicable Laws, Regulations, and Supplemental Authorities

Applicable Laws and Regulations	Description
Federal	
40 Code of Federal Regulations (CFR) Part 52	Nonattainment New Source Review (NSR) requires a permit and requires Best Available Control Technology (BACT) and Offsets. Permitting and enforcement is delegated to MDAQMD. PSD requires major sources or major modifications to major sources to obtain permits for attainment pollutants. The ISEGS project is a new source that has a rule listed emission source thus the PSD trigger levels are 100 tons per year for NOx, VOC, SO_2, PM2.5 and CO. This project's proposed emissions are below NSR and PSD applicability thresholds.
40 CFR Part 60	New Source Performance Standards (NSPS), Subpart Da Standards of Performance for Electricity Steam Generation Units. Establishes emission standards and monitoring/recordkeeping requirements for units with greater than 250 MMBtu/hr heat input. Subpart Db Standards of Performance for Electricity Steam Generation Units. Establishes emission standards and monitoring/recordkeeping requirements for units with greater than 100 MMBtu/hr heat input. Subpart IIII Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. Establishes emission standards for compressions ignition internal combustion engines, including emergency fire water pump engines.
40 CFR Part 93 General Conformity	Requires determination of conformity with State Implementation Plan for Projects requiring federal approvals it project annual emissions are above specified levels.
State	
Health and Safety Code (HSC) Section 40910-40930	Permitting of source needs to be consistent with Air Resource Board (ARB) approved Clean Air Plans.
HSC Section 41700	Restricts emissions that would cause nuisance or injury.
CCR Section 93115	Airborne Toxics Control Measure for Stationary Compression Ignition Engines. Limits the types of fuels allowed, established maximum emission rates, establishes recordkeeping requirements on stationary compression ignition engines, including emergency fire water pump engines.
Local (Mojave Desert Air Quality Management District, MDAQMD)	
Rule 201 and 203 Permits Required	Requires a Permit to Construct before construction of an emission source occurs. Prohibits operation of any equipment that emits or controls air pollutant without first obtaining a permit to operate.
Rules 401, 402, 403, and 403.2 Nuisance, Visible Emissions, Fugitive Dust	Limits the visible, nuisance, and fugitive dust emissions and would be applicable to the construction period of the project.
Rule 404 Particulate Matter - Concentration	Limits the particulate matter concentration from stationary source exhausts.

Applicable Laws and Regulations	Description
Rule 900 Standard of Performance for New Stationary Source	Incorporates the Federal NSPS (40 CFR 60) rules by reference.
Regulation XII – Federal Operating Permits	Requires new or modified major facilities, or facilities that trigger NSPS, Acid Rain or other federal air quality programs obtain a Title V federal operating permit.
Rule 1210 – Acid Rain	Requires facilities subject to the federal Acid Rain program obtain permits and comply with emissions and monitoring provisions.
Rule 1303 New Source Review	Specifies BACT/Offsets technology and requirements for a new emissions unit that has potential to emit any affected pollutants.
Rule 1306 Electric Energy Generating Facilities	Describes actions to be taken for permitting of power plants that are within the jurisdiction of the Energy Commission.

4.1.1 Affected Environment

Climate and Meteorology

The project is located in the southern California Mojave Desert, about three and one-half miles west of the California-Nevada border at approximately 2,800 to 3,400 feet above sea level. Relatively high daytime temperatures, large variations in relative humidity, large and rapid diurnal temperature changes, occasional high winds, and sand, dust, and thunderstorms characterize the climate of the Mojave Desert area. The aridity of the region is influenced by a sub-tropical high-pressure system typically off the coast of California and topographical barriers that effectively block the flow of moisture to the region. Seasonally, the precipitation totals in the area range from lows of 0.5 inch in the spring to as high as 8 inches in the winter.

The most recent meteorological (weather) data, collected at the Jean, Nevada monitoring station 16 miles northeast of the project site, was for 2001 through 2002. The measured wind data are graphically represented by quarterly wind roses, provided in the AFC Figures 5.1-1 and 5.1-2 (CH2M Hill 2007). These wind roses show that for most of the year, the winds are from the west-southwest, although between November through March, winds are predominately from the northeast. Mixing heights in the area, which represent the altitudes where different air masses mix together, are estimated to be on average 230 feet (70 meters) in the morning to as high as 5,250 feet (1,600 meters) above ground level in the afternoon.

Existing Ambient Air Quality

The Federal Clean Air Act and the California Clean Air Act both require the establishment of standards for ambient concentrations of air pollutants, called ambient air quality standards (AAQS). The state AAQS, established by the California Air Resources Board, are typically lower (more protective) than the federal AAQS, which are established by the EPA. The state and federal air quality standards are listed in **Table 4.1-5**. As indicated in **Table 4.1-5**, the averaging times for the various air quality standards, the times over which they are measured, range from one-hour to annual averages. The standards are read as a concentration, in ppm, or as a weighted mass of

material per a volume of air, in milligrams or micrograms of pollutant in a cubic meter of air (mg/m^3 or $\mu g/m^3$, respectively).

In general, an area is designated attainment if the concentration of a particular air contaminant does not exceed the standard. Likewise, an area is designated non-attainment for an air contaminant if that contaminant standard is violated. Where not enough ambient data are available to support designation as either attainment or non-attainment, the area can be designated as unclassified. An unclassified area is normally treated the same as an attainment area for regulatory purposes. An area could be attainment for one air contaminant while non-attainment for another, or attainment for the federal standard and non-attainment for the state standard for the same air contaminant.

ISEGS is located in the Mojave Desert Air Basin (MDAB) and is under the jurisdiction of the MDAQMD. This area is designated as moderate nonattainment for the state ozone standard, nonattainment for both the state and the federal PM10 standards, attainment for federal ozone standard, and attainment or unclassified for the state and federal CO, NO_2, SO_2, and PM2.5 standards. **Table 4.1-6** summarizes the area's attainment status for various applicable state and federal standards.

Table 4.1-5
Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	Federal Standard	California Standard
Ozone (O_3)	8 Hour	0.075 ppm a (147 $\mu g/m^3$)	0.070 ppm (137 $\mu g/m^3$)
	1 Hour	—	0.09 ppm (180 $\mu g/m^3$)
Carbon Monoxide (CO)	8 Hour	9 ppm (10 mg/m^3)	9.0 ppm (10 mg/m^3)
	1 Hour	35 ppm (40 mg/m^3)	20 ppm (23 mg/m^3)
Nitrogen Dioxide (NO_2)	Annual	0.053 ppm (100 $\mu g/m^3$)	0.03 ppm (57 $\mu g/m^3$)
	1 Hour	—	0.18 ppm (339 $\mu g/m^3$)
Sulfur Dioxide (SO_2)	Annual	0.030 ppm (80 $\mu g/m^3$)	—
	24 Hour	0.14 ppm (365 $\mu g/m^3$)	0.04 ppm (105 $\mu g/m^3$)
	3 Hour	0.5 ppm (1300 $\mu g/m^3$)	—
	1 Hour	—	0.25 ppm (655 $\mu g/m^3$)
Particulate Matter (PM10)	Annual	—	20 $\mu g/m^3$
	24 Hour	150 $\mu g/m^3$	50 $\mu g/m^3$
Fine Particulate Matter (PM2.5)	Annual	15 $\mu g/m^3$	12 $\mu g/m^3$
	24 Hour	35 $\mu g/m^3$	—
Sulfates (SO_4)	24 Hour	—	25 $\mu g/m^3$
Lead	30 Day Average	—	1.5 $\mu g/m^3$
	Calendar Quarter	1.5 $\mu g/m^3$	—
Hydrogen Sulfide (H_2S)	1 Hour	—	0.03 ppm (42 $\mu g/m^3$)

Pollutant	Averaging Time	Federal Standard	California Standard
Vinyl Chloride (chloroethene)	24 Hour	—	0.01 ppm (26 μg/m3)
Visibility Reducing Particulates	8 Hour	—	In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70%.

Source: ARB 2009a.

Table 4.1-6
Federal and State Attainment Status Mojave Desert Air Basin[a]

Pollutant	Attainment Status[b]	
	Federal	State
Ozone	Attainment	Moderate Nonattainment
CO	Attainment	Attainment
NO_2	Attainment	Attainment
SO_2	Attainment	Attainment
PM10	Nonattainment	Nonattainment
PM2.5	Attainment	Attainment

Source: ARB 2009b, EPA 2009a.
Notes:
a Attainment status for the site area only, not the entire MDAB.
b Attainment = Attainment or Unclassified.

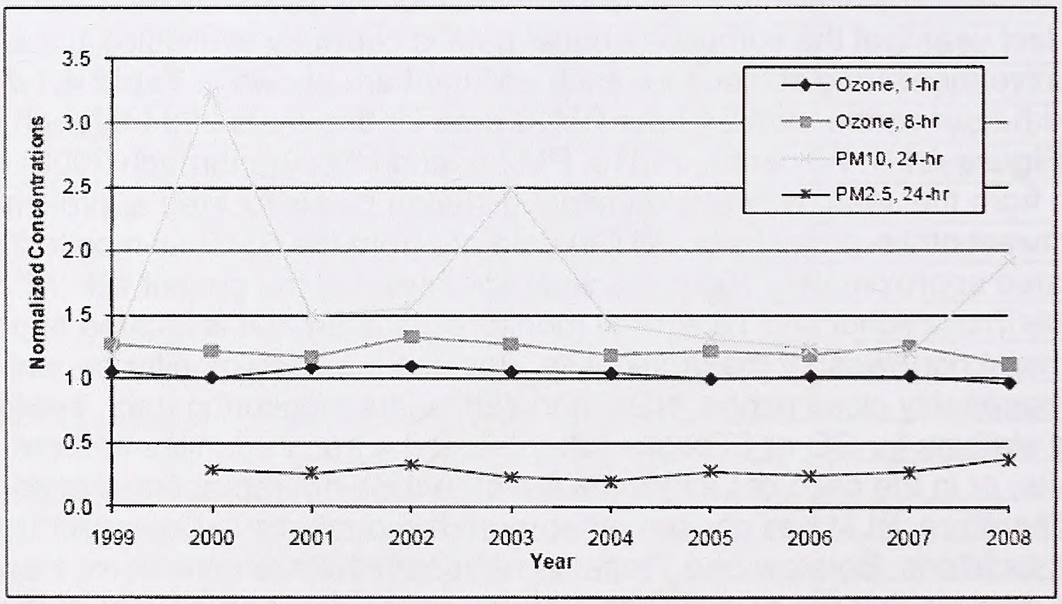
Ambient air quality monitoring data for ozone, PM10, PM2.5, CO, NO_2, and SO_2, compared to most restrictive applicable standards for the years between 2004 through 2008 (the last year that the complete annual data is currently available) at the most representative monitoring stations for each pollutant are shown in **Table 4.1-7** and the 1-hour and 8-hour ozone, and 24-hour PM10 data for the years 2004 through 2008 are shown in **Figure 4.1-1**. All ozone, PM10, PM2.5, and NOx (up through 2006) data shown are from the Jean, Nevada, monitoring station that is located approximately 17 miles northwest of the project site. All CO data are from the Barstow monitoring station that is located approximately 100 miles west southwest of the project site. All SOx data are from the Trona Athol and Telegraph monitoring station that is located approximately 110 miles west northwest of the project site. Besides the Jean monitoring station, which provides reasonably close ozone, NOx, and particulate monitoring data, available monitoring stations for CO or SOx are either located a hundred miles or more away from the site, or in the case of Las Vegas are otherwise not representative as an urban location. Therefore, BLM has chosen other more remote Mojave Desert Air Basin monitoring locations, Barstow and Trona, to represent the site conditions. However, while BLM expects that the background ambient concentrations for both of these pollutants to be relatively low at the project site, there is a reduced overall confidence in the representativeness of these monitoring stations.

Table 4.1-7
Criteria Pollutant Summary Maximum Ambient Concentrations (ppm or μg/m³)

Pollutant	Averaging Period	Units	2004	2005	2006	2007	2008	Limiting AAQS
Ozone	1 hour	ppm	0.094	0.090	0.092	0.092	0.087	0.09
Ozone	8 hours	ppm	0.083	0.085	0.083	0.088	0.078	0.07
PM10[a]	24 hours	μg/m³	71	66	62	60	96	50
PM10[a,b]	Annual	μg/m³	15.9	17.3	12.1	12.7	12.7	20
PM2.5[a,c]	24 hours	μg/m³	7.3	10.2	9.0	11.1	12.9	35
PM2.5[a,b]	Annual	μg/m³	3.49	3.78	3.52	4.08	4.52	12
CO	1 hour	ppm	1.6	3.3	3.5	1.4	1.4	20
CO	8 hours	ppm	1.18	1.34	1.19	0.70	1.23	9.0
NO_2	1 hour	ppm	0.032	0.039	0.036	ND	ND	0.18
NO_2	Annual	ppm	0.0035	0.0039	0.0035	ND	ND	0.03
SO_2	1 hour	ppm	0.019	0.0188	0.033	0.014	0.036	0.25
SO_2	24 hours	ppm	0.005	0.004	0.005	0.004	0.005	0.04
SO_2	Annual	ppm	0.001	0.001	0.001	0.001	0.001	0.03

Source: ARB 2008a, ARB 2009c, EPA 2009b
ND – no data
Notes:
a Exceptional PM concentration events, such as those caused by windstorms are excluded in the data presented.
b Annual average data is federal data and may not exactly represent California annual average.
c The EPA database used for retrieval of the PM2.5 data did not allow direct determination of the calculated 98th percentile, which is the basis of the standard, so the closest proxy (third highest values) are presented.

Figure 4.1-1
1999-2008 Historical Ozone and PM Air Quality Data - Jean, Nevada



Source: EPA 2009b
Note: The highest measured ambient concentrations of various criteria air contaminants were divided by their applicable standard and provided as a graphical point. Any point on the chart that is greater than one means that the measured concentrations of such air contaminant exceed the standard, and any point that is less than one means that the respective standard is not exceeded for that year. For example the 1-hour ozone concentration in 2005 is 0.090 ppm/0.09 ppm standard = 1.0.

Ozone

The area is classified attainment of the federal 8-hour ozone standard and is classified as nonattainment of the state ozone standards. The ambient data shown in **Table 4.1-7** indicates that 8-hour concentrations near the site (Jean, Nevada) exceed the recently revised federal 8-hour ozone standard (0.075 ppm). However, the values shown are peak values that correspond to the state standard. The federal standard is based on the fourth highest 8-hour concentration in a year averaged over three years.

The current federal 8-hour ozone attainment status was determined in 2004, was based on the former 8-hour ozone standard of 0.08 ppm, and would have considered state lines and monitoring station locations, where the data shown is from Nevada, not California. The State of California has recommended to EPA that the northeast portion of San Bernardino County be designated as nonattainment of the new federal ozone standard (ARB 2009d) with an 8-hour ozone design value of 0.080 ppm for the northeast portion of San Bernardino County. EPA has not yet commented on this recommendation.

Ozone is not directly emitted from stationary or mobile sources, but is formed as the result of chemical reactions in the atmosphere between directly emitted NOx and hydrocarbons (VOC) in the presence of sunlight to form ozone. **Figure 4.1-1** shows that the maximum 1-hour ozone concentrations monitored near the site in Jean, Nevada, have been relatively stable over the past ten years and are just over the state's 1-hour standard for most years from 1999 to 2008. The maximum 8-hour ozone concentrations also have been relatively stable over the past ten years but are somewhat higher in relation to the AAQS than the 1-hour ozone levels, hovering between 1.2 to 1.4 times the California 8-hour ozone standard since 1999.

The Air Resource Board (ARB) report: *Second Triennial Review of the Assessment of the Impacts of Transported Pollutants on Ozone Concentrations in California* (ARB 1996) provided the following observations regarding ozone violations in the Mojave Desert area:

- The ozone and ozone precursors from the South Coast Air Basin contribute overwhelmingly to ozone violations in the Mojave Desert Air Basin.
- There are days when a combination of local emissions and transported ozone or precursors contribute to the violations of 1-hour ozone standards,
- There is a possibility that on at least one day of the year the violations of the 1-hour ozone standards are the direct result of local source emissions.

However, BLM notes that in the area of the project site at the far eastern end of the MDAB there is also the potential for ozone transport from the much closer Las Vegas area. However, regardless of the source, it is clear that the main source of the ozone concentrations encountered in the project site area are primarily the result of pollutant transport from urban areas.

Nitrogen Dioxide

The entire air basin is classified attainment of the state 1-hour and federal annual NO_2 standards. The NO_2 levels monitored in Jean, Nevada, are no more than 25 percent of

the most stringent NO_2 ambient air quality standard. Approximately 90 percent of the NOx emitted from combustion sources is NO, while the balance is NO_2. NO is oxidized in the atmosphere to NO_2, but some level of photochemical activity is needed for this conversion. The highest concentrations of NO_2 typically occur during the fall. The winter atmospheric conditions can trap NO emissions near the ground but lacking substantial photochemical activity (sun light), oxidation of NO to NO_2 and NO_2 levels remain relatively low. In the summer the conversion rates of NO to NO_2 are high, but the relatively high temperatures and windy conditions disperse pollutants, preventing the accumulation of NO_2 at levels that might approach the 1-hour ambient air quality standard.

Carbon Monoxide

The area is classified attainment of the state and federal 1-hour and 8-hour CO standards. The highest concentrations of CO occur when low wind speeds and a stable atmosphere trap the pollution emitted at or near ground level. These conditions occur frequently in the wintertime late in the afternoon, persist during the night and may extend one or two hours after sunrise.

Particulate Matter (PM10)

The area is nonattainment for both the state and the federal PM10 standards. PM10 can be emitted directly as fugitive dust or combustion particulates, or it can be formed many miles downwind from emission sources when various precursor pollutants interact in the atmosphere. Gaseous emissions of pollutants like NOx, SOx and VOC from combustion sources, and ammonia (NH_3) from human and animal wastes or combustion NOx control equipment can, given the right meteorological conditions, form particulate matter known as nitrates (NO_3), sulfates (SO_4), and organic compounds. These pollutants are known as secondary particulates, because they are not directly emitted but are formed through complex chemical reactions between directly emitted pollutants in the atmosphere.

Figure 4.1-1 indicates that the state 24-hour ambient air quality standard for PM10 was exceeded every year from 1999 to 2008, with highs close to three and a half times the state 24-hour PM10 standard.

Fine Particulate Matter (PM2.5)

Fine particulate matter, or PM2.5 (particulate matter less than 2.5 microns in diameter), is derived either mainly from the combustion of materials, or from precursor gases (SOx, NOx, and VOC) through complex reactions in the atmosphere. PM2.5 consists mostly of sulfates, nitrates, ammonium, elemental carbon, and a small portion of organic and inorganic compounds. Some PM2.5 emissions come from fugitive dust sources such as unpaved roads and construction sites.

The Mojave Desert Air Basin in the area of the project site is classified as attainment or unclassified for both the state and the federal PM2.5 air quality standards, but as noted previously the area is not in attainment of the state and federal PM10 standards. This divergence indicates that the ambient particulate matter levels are most likely due to

localized fugitive dust sources, such as vehicles travel on unpaved roads, agricultural operations, or wind-blown dust.

Sulfur Dioxide

The entire air basin is classified as attainment for the state and federal SO_2 standards. Sulfur dioxide is typically emitted as a result of the combustion of a fuel containing sulfur. Sources of SO_2 emissions within the MDAB come from a wide variety of fuels: gaseous, liquid and solid; however, the total SO_2 emissions within the eastern MDAB are limited due to the limited number of major stationary sources and California's and EPA's substantial reduction in motor vehicle fuel sulfur content. The project area's SO_2 concentrations are well below the state and federal ambient air quality standards.

Nitrates and Sulfates

PM nitrate (mainly ammonium nitrate) is formed in the atmosphere from the reaction of NOx and ammonia. NOx, as emitted from combustion sources, is mainly in the form of NO. NO converts to NO_2 primarily by reacting with ozone in the ambient air and sunlight. The formed NO_2 can convert back to NO, which sustains the ozone formation reactions. NO_2 can also form organic nitrates, or be reduced to nitric acid by available hydroxyl radicals in the ambient air. Nitric acid reacts with ammonia in ambient air to form ammonium nitrate. Ammonium nitrate, in its particulate form, can remain suspended in the ambient air and/or be transported long distance downwind as PM2.5. Ammonium nitrate, under certain conditions of heat and humidity, breaks down to NOx and starts a new ozone cycle again.

PM sulfate (mainly ammonium sulfate) is formed in the atmosphere from the oxidation of SO_2 and subsequent neutralization by ammonia in the atmosphere. The oxidation of SO_2 depends on many factors, which include the availability of sulfur, hydroxyl, hydroperoxy and methylperoxy radicals, and atmospheric humidity.

Summary of Ambient Air Quality

In summary, the background ambient air concentrations in **Table 4.1-8** were used in the modeling and impacts analysis. These background concentrations are based on the maximum criteria pollutant concentrations from the past three years of available data collected at the monitoring stations within the Mojave Desert.

Table 4.1-8
Recommended Background Concentrations (μg/m³)

Pollutant	Averaging Time	Recommended Background	Limiting Standard	Percent of Standard
NO2	1 hour	73.3	339	22%
	Annual	7.3	57	13%
PM10	24 hour	96	50	192%
	Annual	12.7	20	64%
PM2.5	24 hour	12.9	35	39%
	Annual	4.5	12	38%
CO	1 hour	4,025	23,000	18%
	8 hour	1,367	10,000	14%
SO2	1 hour	94.3	655	14%
	24 hour	13.1	105	12%
	Annual	2.7	80	3%

Source: ARB 2008a, ARB 2009c, EPA 2009b and Energy Commission Staff Analysis
Note: PM2.5 24-hour data shown in **Table 4.1-6** are 99th percentile values; however, the standard is based on the three year average of the 98th percentile, so the background concentration used is somewhat conservative.

Where possible, BLM prefers that the recommended background concentrations come from nearby monitoring stations with similar characteristics. For this project the Jean monitoring station (ozone, PM10, PM2.5, and NO_2 [up to 2006]) is located reasonably close to the project site and should be fairly representative of the project site. The Barstow (CO) monitoring station is located in a more populated area and may provide conservatively high background concentrations for the project site. The Trona (SO_2) monitoring station, while located in a more remote area has two very large nearby emission sources of SOx (Searles Valley Minerals and Ace Cogeneration Company) so this monitoring station location should also provide representative or conservative SOx background concentrations for the project site.

The background 24-hour concentrations for PM10 are above the most restrictive existing ambient air quality standards, while the background concentrations for the other pollutants and averaging times are all below the most restrictive existing ambient air quality standards.

The pollutant modeling analysis was limited to the pollutants listed above in **Table 4.1-8**; therefore, recommended background concentrations were not determined for the other criteria pollutants (ozone, lead, etc.) or background values determined for other ambient standards (visibility reducing particulates).

4.1.2 Environmental Consequences

Methodology

BLM assessed three kinds of primary and secondary[1] impacts: construction, operational, and cumulative. Construction impacts result from the emissions occurring during site preparation and construction of the project. Operational impacts result from the emissions of the proposed project during normal operation, which includes all of the onsite auxiliary equipment (boilers, cooling tower, fire pump engine, etc.) and the maintenance vehicle emissions. Cumulative impacts, discussed in Section 5, result from the proposed project's incremental effect, together with other closely related past, present and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project.

The NEPA air quality analysis considers the following three regulatory thresholds:

- General Conformity applicability thresholds, which for this project is limited to 100 tons per year of PM10 and PM10 precursors (NOx and SOx). This regulatory threshold applies to both project construction and operation emissions.
- PSD permit applicability thresholds, which for this project as a listed major source category is 100 tons per year for the criteria pollutants. This regulatory threshold only applies to project operation and only applies to direct project emissions, and does not apply to secondary emissions, such as fugitive dust emissions.
- Project would cause air quality impacts in exceedance of the National Ambient Air Quality Standards (NAAQS).

If the project were to exceed either of the first two of these regulatory thresholds then there could potentially be direct, adverse impacts which would require a further refined impact and mitigation analysis in order to demonstrate that no impacts would occur based on the potential to cause exceedances of the NAAQS.

While the emissions are the actual mass of pollutants emitted from the project, the impacts are the concentration of pollutants from the project that reach the ground level. When emissions are expelled at a high temperature and velocity through the relatively tall stack, the pollutants would be substantially diluted by the time they reach ground level. The emissions from the proposed project, both stationary source and onsite mobile source emissions, are analyzed through the use of air dispersion models to determine the probable impacts at ground level.

Air dispersion models provide a means of predicting the location and ground level magnitude of the impacts of a new emissions source. These models consist of several complex series of mathematical equations, which are repeatedly calculated by a computer for many ambient conditions to provide theoretical maximum offsite pollutant concentrations short-term (1-hour, 3-hour, 8-hour, and 24-hour) and annual periods.

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[1] Primary impacts potentially result from facility emissions of NOx, SOx, CO and PM10/2.5. Secondary impacts result from air contaminants that are not directly emitted by the facility but formed through reactions in the atmosphere that result in ozone, and sulfate and nitrate PM10/PM2.5.

The model results are generally described as maximum concentrations, often described as a unit of mass per volume of air, such as μg/m^3.

The applicant has used the EPA-approved ARMS/EPA Regulatory Model (AERMOD version 07026) air dispersion model to estimate the direct impacts of the project's NOx, PM10, CO, and SOx emissions resulting from project construction and operation. Additionally, boiler emission fumigation impacts during inversion breakup conditions were determined using the EPA approved SCREEN3 model.

BLM revised the background concentrations provided by the applicant, replacing them with the available highest ambient background concentrations for the last three years from representative monitoring sites as shown in **Table 4.1-8**. BLM added the modeled impacts to these background concentrations, then compared the results with the ambient air quality standards for each respective air contaminant to determine whether the project's emission impacts would cause a new violation of the ambient air quality standards or would contribute to an existing violation.

The inputs for the air dispersion models include stack information (exhaust flow rate, temperature, and stack dimensions), specific boiler emission data and meteorological data, such as wind speed, atmospheric conditions, and site elevation. For this project, the meteorological data used as inputs to the model included hourly wind speeds and directions measured at the Jean, Nevada, meteorological site during 2001 and 2002, which is the closest complete meteorological data source to the project site, and supplemented to fill missing data using the Nellis Air Force Base meteorological site. Concurrent upper air data from the Mercury Desert Rock Airport in Mercury, Nevada was also used.

Additionally, the applicant obtained hourly ozone and NO_2 ambient data from the Barstow monitoring station for 2001 and 2002 that was used in a more refined NO_2 impact modeling analysis using the Plume Volume Molar Ratio Method (PVMRM), available with AERMOD that integrates the Ozone Limiting Method (OLM) with the downwind plume stoichiometry.

4.1.2.1 Proposed Project

Construction Impacts

The ISEGS project consists of three phases, each of which would require approximately 24 months of partially overlapping construction that would last a total of 48 months (CH2M Hill 2007). Construction generally consists of two major activities: site preparation, and construction and installation of major equipment and structures. In addition to fugitive dust emissions resulting from the site preparation, emissions from construction equipment exhausts, such as vehicles and internal combustion engines, would also occur during the project construction phase. In addition, a small amount of hydrocarbon emissions may occur because of the temporary storage of petroleum fuel at the site.

Using estimated peak hourly, daily, and annual construction equipment exhaust and fugitive dust emissions, the applicant performed a modeling analysis. **Table 4.1-9** presents the results of the applicant's modeling analysis.

Table 4.1-9
Maximum Project Construction Impacts

Pollutant	Avg. Period	Impacts ($\mu g/m^3$)	Background [a] ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	Standard ($\mu g/m^3$)	Percent of Standard
NO2	1-hr	200.4	73.3	273.7	339	81%
	Annual	0.2	7.3	7.5	57	13%
PM10	24-hr	6.7	96	102.7	50	205%
	Annual	0.2	12.7	12.9	20	65%
PM2.5	24-hr	1.6	12.9	14.5	35	41%
	Annual	0.0	4.5	4.5	12	38%
CO	1-hr	109	4,025	4,134	23,000	18%
	8-hr	24	1,367	1,391	10,000	14%
SO2	1-hr	0.9	94.3	95.2	665	14%
	24-hr	0.0	13.1	13.1	105	12%
	Annual	0.0	2.7	2.7	80	3%

Source: CH2M Hill 2008f.
Note:
a - Background values have been adjusted per recommended background concentrations shown in **Table 4.1-8**.

This modeling analysis indicates, with the exception of 24-hour PM10 impacts, that the project would not create new exceedances or contribute to existing exceedances for any of the modeled air pollutants. BLM notes that the maximum local background 24-hour measurements of PM10 may be substantially impacted by wind-blown dust. However, in light of the existing PM10 and ozone non-attainment status for the project site area, the construction NOx, VOC, and PM emissions would be potentially adverse and, therefore, the off-road equipment and fugitive dust emissions should be mitigated to the extent feasible.

The modeling analysis shows that, after implementation of the fugitive dust mitigation measures, the project's construction is not predicted to cause violations of the NAAQS. Therefore, no direct adverse impacts would occur after implementation of the fugitive dust mitigation measures.

Applicant Proposed Mitigation Measures

To mitigate the impacts due to construction of the facility, the applicant has proposed to use the following mitigation measures from the South Coast Air Quality Management District CEQA Guidelines (CH2M Hill 2008e):

A. All unpaved roads and disturbed areas in the project and linear construction sites will be watered until sufficiently wet to ensure that no visible dust plumes leave the project site.

B. Vehicle speeds will be limited to 10 miles per hour within the construction site.

C. All construction equipment vehicle tires will be washed or cleaned free of dirt prior to entering paved roadways.

D. Gravel ramps will be provided at the tire washing/cleaning station.

E. All entrances to the construction site will be graveled or treated with water or dust soil stabilization compounds.

F. Construction areas adjacent to any paved roadway will be provided with sandbags to prevent run-off to the roadway.

G. All paved roads within the construction site will be swept twice daily when construction activity occurs.

H. At least the first 500 feet of any paved public roadway, accessed from the construction site or from unpaved roads en route to the construction site and construction staging areas will be swept regularly on days when construction activity occurs.

I. All soil storage piles and disturbed areas that remain inactive for longer than 10 days will be covered or treated with appropriate dust suppressant compounds.

J. All vehicles that are used to transport solid bulk material on public roadways and that have potential to cause visible emissions will be provided with a cover, or the materials will be sufficiently wetted and loaded onto the trucks in a manner to provide at least two feet of freeboard.

K. Wind erosion control techniques such as windbreaks, water, chemical dust suppressants, and vegetation will be used on all construction areas that may be disturbed. Any windbreaks used will remain in place until the soil is stabilized or permanently covered with vegetation.

L. Construction equipment will be shut down to avoid excessive idling emissions.

M. Construction equipment will use low sulfur, low aromatic diesel fuel.

N. Construction equipment will be maintained in top service shape.

O. Construction equipment used will meet state and federal emission standards for Tier II and Tier III.

Mitigation measures **AQ-SC1 to AQ-SC4** incorporate the applicant's proposed measures, with revisions and additions to reduce the impacts from the construction of the proposed project. Specific changes include a more aggressive dust control requirement to use polymer based, or equivalent, soil stabilizers[2] on the site's unpaved roads and inactive disturbed surfaces during construction.

The construction of the project would cause particulate matter emissions that would add to the existing violations of the ambient PM10 air quality standards. Unmitigated PM10 emissions could exceed General Conformity applicability thresholds, and could potentially cause direct, adverse impacts under NEPA. However, the implementation of proposed specific mitigation measures during construction of the facility would mitigate the potential for adverse impacts.

[2] The soil stabilizer product used will require prior approval by BLM.

Operations Impacts

The following section discusses the project's direct operating and overlapping construction/operating ambient air quality impacts, as estimated by the applicant, and evaluated by BLM. Additionally, this section discusses mitigation measures which would be implemented to avoid or reduce adverse impacts.

Operational Modeling Analysis

The applicant has provided a modeling analysis using the EPA-approved AERMOD model to estimate the impacts of the project's NOx, PM10, CO, and SOx emissions[3] resulting from project operation (CH2M Hill 2008f). Similar to the assessment of construction impacts, BLM added the modeled impacts to the available highest ambient background concentrations recorded during the previous three years from nearby monitoring stations to assess the project operational impacts. **Table 4.1-10** presents the results of the applicant's modeling analysis.

Table 4.1-10
Project Operation Emissions Impacts

Pollutants	Avg. Period	Impacts ($\mu g/m^3$)	Background [a] ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	Standard ($\mu g/m^3$)	Percent of Standard
NO2	1-hr	150.4	73.3	223.4	339	66%
	Annual	0.1	7.3	7.4	57	13%
PM10	24-hr	3.3	96	99.3	50	199%
	Annual	0.5	12.7	13.2	20	66%
PM2.5 [c]	24-hr [b]	0.2	12.9	13.1	35	37%
	Annual	0.0	4.5	4.5	12	38%
CO	1-hr	321	4,025	4,346	23,000	19%
	8-hr	55	1,367	1,422	10,000	14%
SO2	1-hr	3.9	94.3	98.2	665	15%
	24-hr [b]	0.1	13.1	13.2	105	13%
	Annual	0.0	2.7	2.7	80	3%

Source: CH2M Hill 2008f.
Notes:
a Background values have been adjusted per recommended background concentrations shown in **Table 4.1-8**.
b Maximum 24-hour hour PM2.5 and SO2 concentrations occur under fumigation conditions.
c PM2.5 impacts were not remodeled to include maintenance emissions like the other pollutants, the results presented are stationary source emission only from the original AFC modeling analysis. With the maintenance PM2.5 emission the PM2.5 results would be higher than shown but lower than the PM10 results as the PM2.5 emissions are less than the PM10 emissions. Therefore, the PM2.5 impacts with maintenance emissions would not create new exceedances of the ambient air quality standards.

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[3] The applicant's modeling analysis uses assumptions that are somewhat different than those presented in the emissions table (**Table 4.1-2**). Specifically, for the annual emissions modeling the applicant assumed 520 hours of boiler operation rather than the permitted maximum 1,460 hours, and for all averaging periods used manufacturer specified engine emission factors rather than the worst-case emission standard based values used by the agency in **Table 4.1-2**; and assumed one-hour of emergency engine testing rather than the permitted maximum one-half hour of testing. These differences would not change the overall modeling analysis impact findings, but the agency will be adding a Mitigation Measure limiting boiler operation, in terms of heat input, to that which was modeled. This heat input level restriction also formalizes the applicant's stipulation that "Heat input from natural gas will not exceed 5 percent of the heat input from the sun, on an annual basis". (CH2M Hill 2007, p. 5.1-1).

This modeling analysis indicates, with the exception of 24-hour PM10 impacts, that the project would not create new exceedances or contribute to existing exceedances for any of the modeled air pollutants. BLM notes that the maximum local background 24-hour measurements of PM10 may be substantially impacted by wind-blown dust. However, in light of the existing PM10 and ozone non-attainment status for the project site area, the operating NOx, VOC, and PM emissions could potentially result in direct impacts and, therefore, the stationary equipment, the off-road maintenance equipment, and fugitive dust emissions should be mitigated to the extent feasible.

The modeling analysis shows that, after implementation of the fugitive dust mitigation measures, the project's operation is not predicted to cause violations of the NAAQS. Therefore, no adverse impacts would be expected to occur after implementation of the fugitive dust mitigation measures.

Construction/Operation Overlapping Impacts

The applicant has provided a modeling analysis using the EPA-approved AERMOD model to estimate the impacts of the project's NOx, PM10, CO, and SOx emissions[4] resulting from worst-case overlap when the project is in partial operation and still being constructed (CH2M Hill 2008f). Similar to the assessment of the construction and operating impacts, BLM added the modeled impacts to the available highest ambient background concentrations recorded during the previous three years from nearby monitoring stations to assess the project's overlapping construction/operation impacts. **Table 4.1-11** presents the results of the applicant's modeling analysis.

Table 4.1-11
Project Overlapping Construction/Operation Emission Impacts

Pollutants	Avg. Period	Impacts (µg/m3)	Background [a] (µg/m3)	Total Impact (µg/m3)	Standard (µg/m3)	Percent of Standard
NO2	1-hr	202.4	73.3	275.7	339	81%
	Annual	0.3	7.3	7.6	57	13%
PM10	24-hr	10.4	96	106.4	50	213%
	Annual	0.3	12.7	13.0	20	65%
PM2.5	24-hr	3.2	12.9	16.1	35	46%
	Annual	0.3	4.5	4.8	12	40%
CO	1-hr	261	4,025	4,286	23,000	19%
	8-hr	52	1,367	1,419	10,000	14%
SO2	1-hr	3.6	94.3	97.9	665	15%
	24-hr	0.0	13.1	13.1	105	12%
	Annual	0.0	2.7	2.7	80	3%

Source: CH2M Hill 2008f.
Note:
a Background values have been adjusted per recommended background concentrations shown in **Table 4.1-8**.

[4] The applicant's modeling analysis uses assumptions that are somewhat different than those presented in the emissions table (**Table 4.1-3**). Specifically, the operating emissions used are revised as previously noted for the operating emission impact modeling.

This modeling analysis again indicates, with the exception of 24-hour PM10 impacts, that the project would not create new exceedances or contribute to existing exceedances for any of the modeled air pollutants. Considering the existing PM10 and ozone non-attainment status for the project site area, the construction and operating NOx, VOC, and PM emissions could potentially result in adverse impacts and, therefore, these construction and operations emission sources should be mitigated to the extent feasible.

The modeling analysis shows that, after implementation of the fugitive dust mitigation measures, the project's worst-case construction/operation overlap period is not predicted to cause violations of the NAAQS. Therefore, no adverse impacts would be expected to occur after implementation of the fugitive dust mitigation measures.

Chemically Reactive Pollutant Impacts

The project would have direct emissions of chemically reactive pollutants (NOx, SOx, and VOC), but would also have indirect emission reductions associated with the reduction of fossil-fuel fired power plant emissions due to the project displacing the need for their operation. The exact nature and location of such reductions is not known and the overall magnitude and downwind impact of those upwind emission reductions is speculative and BLM's impact analysis has not considered these potential reductions as an offset source for the project's emissions, so the discussion below focuses on the direct emissions from the project.

Ozone Impacts

There are air dispersion models that can be used to quantify ozone impacts, but they are used for regional planning efforts where hundreds or even thousands of sources are input into the modeling to determine ozone impacts. There are no regulatory agency models approved for assessing single source ozone impacts. However, because of the known relationship of NOx and VOC emissions to ozone formation, it can be said that the emissions of NOx and VOC from the ISEGS project do have the potential (if left unmitigated) to contribute to higher ozone levels in the region, which are already designated nonattainment for the state ozone standard.

PM2.5 Impacts

Secondary particulate formation, which is assumed to be 100% PM2.5, is the process of conversion from gaseous reactants to particulate products. The process of gas-to-particulate conversion, which occurs downwind from the point of emission, is complex and depends on many factors, including local humidity and the presence of air pollutants. The basic process assumes that the SOx and NOx emissions are converted into sulfuric acid and nitric acid first and then the acids react with ambient ammonia to form sulfate and nitrate. The sulfuric acid reacts with ammonia much faster than nitric acid and converts completely and irreversibly to particulate form. Nitric acid reacts with ammonia to form both a particulate and a gas phase of ammonium nitrate. The particulate phase will tend to fall out; however, the gas phase can revert back to ammonia and nitric acid. Thus, under the right conditions, ammonium nitrate and nitric acid establish a balance of concentrations in the ambient air. There are two conditions that are of interest, described as ammonia rich and ammonia poor. The term ammonia

rich indicates that there is more than enough ammonia to react with all the sulfuric acid and to establish a balance of nitric acid-ammonium nitrate. Further ammonia emissions in this case would not necessarily lead to increases in ambient PM2.5 concentrations. In the case of an ammonia poor environment, there is insufficient ammonia to establish a balance and thus additional ammonia would tend to increase PM2.5 concentrations.

The northeastern San Bernardino County portion of the Mojave Desert Air Basin has not undergone the rigorous secondary particulate studies that have been performed in other areas of California, such as the San Joaquin Valley, that have more serious fine particulate pollution problems. However, due to the limited agricultural activity in the area the project site area would likely be characterized as ammonia poor, and the ISEGS project is not a notable source of ammonia emissions, so the small amount of operating NOx and SOx emissions that would be generated by this project would have a reduced potential to create secondary particulates.

Impact Summary

The applicant is proposing to mitigate the project's stationary source NOx, VOC, SO_2, and PM10/PM2.5 emissions through the use of boiler emission controls (Low NOx burner and flue gas recirculation) and natural gas fuel for the boilers, and use emergency engines that meet the highest available EPA/ARB Tier emission standards fueled with California 15 ppm sulfur diesel fuel. Additionally, mitigation measure **AQ-SC7** would reduce maintenance vehicle emissions, both tailpipe emission and fugitive dust emissions that could contribute to further ozone and PM10 violations. With the implementation of mitigation measures, the proposed project would not cause secondary pollutant impacts.

Applicant Proposed Mitigation

Emission Controls

As discussed in the air quality section of the AFC (CH2M Hill 2007), the applicant proposes the following emission controls on the stationary equipment associated with the ISEGS operation:

Boilers

The applicant's proposed mitigation for the three boilers includes Low-NOx burners and 20 percent flue gas recirculation (for NOx), good combustion practices (for CO), and operate exclusively on pipeline quality natural gas (for VOC, PM and SOx) to limit boiler emission levels. The AFC (CH2M Hill 2007), and FDOC conditions (MDAQMD 2008b) provides the following emission limits, each for the two smaller (231.1 MMBtu/hour) boilers:

- NOx: 9.0 ppmvd at 3% O_2 (one-hour average), 2.5 lb/hour
- CO: 25 ppmvd at 3% O_2 (one-hour average), 4.2 lb/hour
- VOC: 12.6 ppmvd, 1.2 lb/hour
- PM10: 1.7 lb/hour
- SO_2: 1.7 ppmvd, 0.6 lb/hour.

And provide the following emission limit for the larger (462.2 MMBtu/hour) boiler:

- NOx: 9.0 ppmvd at 3% O_2 (one-hour average), 5.0 lb/hour
- CO: 25 ppmvd at 3% O_2 (one-hour average), 8.5 lb/hour
- VOC: 12.6 ppmvd, 2.5 lb/hour
- PM10: 3.47 lb/hour
- SO2: 1.7 ppmvd, 1.3 lb/hour

Emergency Generator Engines

The applicant's proposed controls for the emergency generator engine is to purchase a new engine meeting current emission standard requirements (Tier 2) for 3,470 bhp engines. Additionally only ARB low sulfur (15 ppm) diesel fuel will be used. The specific emission levels for the selected engine are currently unknown but they will be no higher than following Tier 2 emission standards:

- NOx: 4.8 grams per break horsepower (including non-methane hydrocarbons - NMHC)
- CO: 2.6 grams per break horsepower
- VOC: (see NOx above)
- PM10: 0.15 grams per break horsepower
- SO2: 15 ppm sulfur content fuel

Fire Water Pump Engines

The applicant's proposed the use of a Tier 2 Engine. However, based on currently regulatory requirements (NSPS Subpart IIII - Table 4) BLM will be requiring the use of a Tier 3 engine for the 240 horsepower fire pump engines that will have emission not higher than the following Tier 3 emission standards:

- NOx: 3.0 grams per break horsepower (including NMHC)
- CO: 2.6 grams per break horsepower
- VOC: (see NOx above)
- PM10: 0.15 grams per break horsepower
- SO2: 15 ppm sulfur content fuel

Maintenance Vehicles

The applicant has not proposed any specific emission controls for this emission source.

Delivery and Employee Vehicles

The applicant has not proposed any specific emission controls for this emission source.

Emission Offsets

The applicant has not proposed any emission offsets and the stationary source emissions for ISEGS as currently proposed by the applicant would be well below District offset thresholds.

Adequacy of Applicant-Proposed Mitigation

BLM concurs with the District's determination that the project's stationary source proposed emission controls/emission levels for criteria pollutants meets regulatory requirements and that the proposed stationary source emission levels are reduced adequately.

Additional Mitigation

As mentioned earlier in the discussions of the ozone and PM10 impacts, the project's ozone precursors and PM10 emissions, if unmitigated, could cause adverse impacts. Additionally, a solar renewable project, which would have a 50 life, located in an ozone and PM10 nonattainment area and just upwind of other ozone and PM10 nonattainment areas, should address its contribution to the potentially ongoing nonattainment of the PM10 and ozone standards. Therefore, the following additional mitigation measures have been developed:

- Require the use of new model year vehicles at the time of purchase for onsite maintenance, or equivalently low emitting vehicles as long as those vehicles can be demonstrated to have a similar or lower emission profile than new model year vehicles.
- Limit vehicle speeds within the facility to no more than ten miles per hour on unpaved areas that have not undergone soil stabilization, and up to 25 miles per hour on stabilized unpaved roads as long as no visible dust plumes are observed, to address fugitive PM emissions from the site;
- Apply and maintain a non-toxic soil binder[5] to the onsite unpaved roads to create a durable stabilized surface; and
- Additional ongoing operations fugitive dust emissions control techniques such as windbreaks, trackout controls, etc. should be identified in a fugitive dust control plan and used on areas that could be disturbed by vehicles or wind. Any windbreaks used would remain in place until the soil or road is stabilized.

Measures to avoid or reduce ongoing fugitive dust emissions control are in mitigation measure **AQ-SC7**.

The implementation of these mitigation measures would reduce the potential emission impacts from the facility on ozone and PM10. Additionally, the implementation of the operations fugitive dust mitigation measure would mitigate the potential for adverse impacts.

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[5] The soil stabilizer product used will require prior approval by BLM.

BLM has considered the minority population surrounding the site (see **Figure 4.9-1**). Since the project's direct air quality impacts have been reduced, there would not be any anticipated environmental justice impacts resulting from air quality issues.

Closure and Decommissioning Impacts

Eventually the facility will close, either at the end of its useful life or due to some unexpected situation such as a natural disaster or catastrophic facility breakdown. When the facility closes, all sources of air emissions would cease to operate and thus impacts associated with those emissions would no longer occur. The only other expected emissions would be equipment exhaust and fugitive particulate emissions from the dismantling activities. These activities would be of much shorter duration than construction of the project, equipment are assumed to have much lower comparative emissions due to technology advancement, and fugitive dust emissions would be required to be controlled in a manner at least equivalent to that required during construction. Therefore, while there will be adverse air quality impacts during decommissioning they are expected to be less than those associated with construction.

Beneficial Impacts

By generating needed power with only a small supplemental use of fossil fuels, the Mitigated Ivanpah 3 Alternative would potentially displace greenhouse gas and pollutant emissions associated with fossil fuel-powered generating facilities in the transmission area.

4.1.2.2 Mitigated Ivanpah 3 Alternative

The environmental setting of the Mitigated Ivanpah 3 Alternative, with respect to climate, meteorology, and existing air quality, would be the same as that described for the proposed project. The project location would be almost identical to that of the proposed project, with the exception of the elimination of a 433-acre area in the northern portion of Ivanpah Unit 3. This difference in location is not expected to result in any substantive difference in the climate, meteorology, or air quality data that are considered to be representative of the site for purposes of establishing background ambient air concentrations, and for evaluating potential impacts under NEPA.

The difference in location also does not affect the regulatory authority responsible for air quality, which is the MDAQMD, or the standards for regulatory compliance or significance of impacts. The area is located within the MDAB, and is designated as moderate non-attainment for the state ozone and PM2.5 standards, and the state and federal PM10 standards. The area is classified as being in attainment for the federal ozone and PM2.5 standards, and as unclassified/attainment for state and federal CO, NO_2, and SO_2 standards.

Construction Impacts

The construction impacts resulting from the Mitigated Ivanpah 3 Alternative would be associated with fugitive dust emissions, emissions from construction vehicles, and emissions from worker commuting vehicles. The construction of the Mitigated Ivanpah 3 Alternative would be expected to generate approximately the same rates of

fugitive dust, construction vehicle emissions, and worker commuting vehicle emissions as the proposed project. Although the size, number of power tower receivers, and number of heliostats would be reduced, it is expected that the construction would occur with the same type and amount of equipment and workers as the proposed project. The primary difference would be that the duration of construction would be expected to be shorter for the Mitigated Ivanpah 3 Alternative, by approximately 17 percent (48 months for the proposed project versus 40 months for the Mitigated Ivanpah 3 Alternative). Although the rate of emissions would be the same for the construction of both alternatives, the overall mass of emissions associated with the Mitigated Ivanpah 3 Alternative would be lower, due to the reduced duration of construction.

Although the air quality impacts associated with construction of the Mitigated Ivanpah 3 Alternative would be reduced from those associated with the proposed project, it would still potentially cause direct, adverse air quality impacts. Therefore, mitigation measures **AC-SC1** through **AQ-SC4** would also be applicable to the Mitigated Ivanpah 3 Alternative.

<u>**Operations Impacts**</u>

Operations impacts associated with the Mitigated Ivanpah 3 Alternative would result from the following sources:

- Fugitive dust from vehicle traffic on unpaved roads and maintenance paths;
- Emissions from maintenance vehicles;
- Emissions from worker's commuting vehicles; and
- Emissions from stationary sources such as the boilers, emergency generators, and emergency fire water pumps.

In the submittal describing the Mitigated Ivanpah 3 proposal (BSE 2010a), the applicant's original air modeling for the stationary sources was modified to account for the differences in the number, size, and locations of the sources with respect to the property boundaries. The other factors, including background concentrations, meteorological input data, and the modeling methodology were kept the same as those used for the original modeling. The primary differences between the proposed project and the Mitigated Ivanpah 3 Alternative included:

- The size of the boiler at Ivanpah Unit 3 was reduced from 462.2 to 231.1 MMBtu/hr (50 percent), resulting in a reduction in fuel use.
- One of the two emergency generators proposed for Ivanpah Unit 3 for the proposed project would be eliminated in the Mitigated Ivanpah 3 Alternative.
- The Ivanpah Unit 3 power block, including the associated emissions sources (boiler, emergency generator, and emergency fire pump), would be moved 272 feet to the southwest, which is closer to the ROW boundary than as in the proposed project.

In general, these changes result in a lower mass of emissions from the Mitigated Ivanpah 3 Alternative, as compared to the proposed project, and therefore reduced

concentrations of almost all pollutants in almost all locations and durations. The only exception is the modeling result for NO_2 impacts, which shows an increase in short-term (1-hour and 3-hour) concentrations at the site boundary. This result occurs because, even though the number of emergency generators was reduced from two to one, the original modeling assumed that only one would operate at any given time. Therefore, the total amount of emissions released during the short-term testing of the emergency generator was the same in the modeling for the proposed project and the Mitigated Ivanpah 3 Alternative. Because the generator in the Mitigated Ivanpah 3 Alternative is located 272 feet closer to the site boundary, the result for the short-term analyses (1-hr and 3-hr) showed an increase over the proposed project. However, the increase in maximum concentration is small (123.7 ug/m^3 for the proposed project versus 126.7 ug/m^3 for the Mitigated Ivanpah 3 Alternative), and the overall mass of emissions per year would be reduced by 50 percent.

Overall, air emissions associated with operation of the Mitigated Ivanpah 3 Alternative would be lower than those associated with the proposed project. However, the emissions could still cause direct, adverse impacts to air quality in the absence of mitigation measures. Mitigation measure **AC-SC7** would also be applicable to the Mitigated Ivanpah 3 Alternative. However, due to the different sizes of boilers associated with the Mitigated Ivanpah 3 Alternative, the District permit conditions, which are the basis of mitigation measures **AQ-1** through **AQ-39**, would be different for this alternative. The revised mitigation measures are provided in Section 4.1.4.

Closure and Decommissioning Impacts

Similar to construction, the closure and decommissioning impacts resulting from the Mitigated Ivanpah 3 Alternative would be associated with fugitive dust emissions, emissions from heavy equipment, and emissions from worker commuting vehicles. For the proposed project, these emissions would not have an adverse impact on air quality, for the following reasons:

- The activities would have a much shorter duration than construction;
- Emissions from equipment would be expected to be lower due to technology advancement; and
- The activities would likely be controlled with mitigation measures that were equivalent or superior to those used for construction.

Based on these factors, including the shorter duration associated with decommissioning the reduced acreage of disturbance, reduced number of heliostats, and reduced number of power tower receivers, adverse impacts associated with closure and decommissioning of the Mitigated Ivanpah 3 Alternative would not be expected.

Beneficial Impacts

By generating needed power with only a small supplemental use of fossil fuels, the Mitigated Ivanpah 3 Alternative would potentially displace greenhouse gas and pollutant emissions associated with fossil fuel-powered generating facilities in the transmission area.

4.1.2.3 Modified I-15 Alternative

The environmental setting of the Modified I-15 Alternative, with respect to climate, meteorology, and existing air quality, would be the same as that described for the proposed project. The project location would be almost identical to that of proposed project, with the exception that the location of Ivanpah Unit 3 would be reconfigured approximately four miles south of its location in the proposed project. This difference in location is not expected to result in any substantive difference in the climate, meteorology, or air quality data that are considered to be representative of the site for purposes of establishing background ambient air concentrations, and for evaluating the potential impacts under NEPA. The difference in location also does not affect the regulatory authority responsible for air quality, which is the MDAQMD, or the standards for regulatory compliance or significance of impacts.

<u>**Construction Impacts**</u>

The construction impacts resulting from the Modified I-15 Alternative would be associated with fugitive dust emissions, emissions from construction vehicles, and emissions from worker commuting vehicles. The construction of the Modified I-15 Alternative would be expected to generate approximately the same rates of fugitive dust, construction vehicle emissions, and worker commuting vehicle emissions as the proposed project. Although the size, number of power tower receivers, and number of heliostats would be reduced, it is expected that the construction would occur with the same type and amount of equipment and workers as the proposed project. The two differences between the Modified I-15 Alternative and the proposed project would be the duration of construction, and the different location of Ivanpah Unit 3.

The duration of construction would be expected to be shorter for the Modified I-15 Alternative, by approximately 17 percent (48 months for the proposed project versus 40 months for the Modified I-15 Alternative). Although the rate of emissions would be the same for the construction of both alternatives, the overall mass of emissions associated with the Modified I-15 Alternative would be lower, due to the reduced duration of construction.

The construction of Ivanpah Unit 3 would occur in a location that is four miles south of its location in the proposed project. The reconfigured location is not any closer to or further from local residents or sensitive receptors than the original location, so the emissions associated with construction would not have adverse impacts on receptors.

Although the air quality impacts associated with construction of the Modified I-15 Alternative would be reduced from those associated with the proposed project, it would still potentially cause direct, adverse air quality impacts. Therefore, mitigation measures developed for the proposed project would also be applicable to the Modified I-15 Alternative.

<u>**Operations Impacts**</u>

Operations impacts associated with the Modified I-15 Alternative would result from the following sources:

- Fugitive dust from vehicle traffic on unpaved roads and maintenance paths;

- Emissions from maintenance vehicles;
- Emissions from worker's commuting vehicles; and
- Emissions from stationary sources such as the boilers, emergency generators, and emergency fire water pumps.

No modeling has been conducted specifically to estimate operational air emissions from the Modified I-15 Alternative. In the submittal describing the Mitigated Ivanpah 3 proposal (BSE 2010a), the applicant's original air modeling for the stationary sources was modified to account for the differences in the number, size, and locations of the sources with respect to the property boundaries. For the Modified I-15 Alternative, it is assumed that all of these parameters, including the number, size, and distance from each source to the property boundaries would be the same as assumed in the modeling for the Mitigated Ivanpah 3 Alternative. The assumptions used for the Mitigated Ivanpah 3 Alternative modeling, and which are assumed to be applicable to the Modified I-15 Alternative, include background concentrations, meteorological input data, and the modeling methodology. These include:

- The size of the boiler at Ivanpah Unit 3 was reduced from 462.2 to 231.1 Mmbtu/hr (50 percent), resulting in a reduction in fuel use from the proposed project.
- One of the two emergency generators proposed for Ivanpah Unit 3 for the proposed project would be eliminated in the Modified I-15 Alternative.
- The Ivanpah Unit 3 power block, including the associated emissions sources (boiler, emergency generator, and emergency fire pump), would be moved 272 feet closer to the ROW boundary than as in the proposed project.

As in the Mitigated Ivanpah 3 Alternative, these changes result in a lower mass of emissions from the Modified I-15 Alternative, as compared to the proposed project, and therefore reduced concentrations of almost all pollutants in almost all locations and durations. The only exception is the modeling result for NO_2 impacts, which shows an increase in short-term (1-hour and 3-hour) concentrations at the site boundary due the placement of the Unit 3 power block 272 feet closer to that boundary.

The operational emissions associated with Ivanpah Unit 3 would be located four miles south of their location in the proposed project. The reconfigured location is not any closer to or further from local residents or sensitive receptors than the original location, so the emissions associated with operations would not have adverse impacts on receptors.

Overall, air emissions associated with operation of the Modified I-15 Alternative would be lower than those associated with the proposed project. However, the emissions could still cause direct, adverse impacts to air quality in the absence of mitigation measures. Mitigation Measure **AC-SC7** would also be applicable to the Modified I-15 Alternative. However, due to the different sizes of boilers associated with the Modified I-15 Alternative, the District permit conditions, which are the basis of Mitigation measures **AQ-1** through **AQ-39**, would be different for this alternative. The revised

mitigation measures, which would be applicable to both the Mitigated Ivanpah 3 and Modified I-15 Alternatives, are provided in Section 4.1.4.

Closure and Decommissioning Impacts

Similar to construction, the closure and decommissioning impacts resulting from the Modified I-15 Alternative would be associated with fugitive dust emissions, emissions from heavy equipment, and emissions from worker commuting vehicles. For the proposed project, these emissions would not have an adverse impact on air quality, for the following reasons:

- The activities would have a much shorter duration than construction;
- Emissions from equipment would be expected to be lower due to technology advancement; and
- The activities would likely be controlled with mitigation measures that were equivalent or superior to those used for construction.

Based on these factors, including the shorter duration associated with decommissioning the reduced acreage of disturbance, reduced number of heliostats and reduced number of power tower receivers, adverse impacts associated with closure and decommissioning of the Modified I-15 Alternative would not be expected.

Beneficial Impacts

By generating needed power with only a small supplemental use of fossil fuels, the Modified I-15 Alternative would potentially displace greenhouse gas and pollutant emissions associated with fossil fuel-powered generating facilities in the transmission area.

4.1.2.4 No Action Alternative

In the No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 USC 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project.
- The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated pollutant emissions would not occur.

If this project were not approved, renewable projects would likely be developed on other sites in the Mojave Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates.

4.1.3 Compliance with Applicable Laws, Regulations, and Supplemental Authorities

The Mojave Desert Air Quality Management District issued the Preliminary Determination of Compliance (PDOC) for the ISEGS on December 23, 2008 (MDAQMD 2008a), and the Final Determination of Compliance (FDOC), second revision version Rev. B, on July 15, 2009 (MDAQMD 2008b). On April 15, 2010, the District issued Revision C of the FDOC (MDAQMD 2010). The MDAQMD issued this revision to the FDOC primarily to reflect equipment changes associated with the applicant's Mitigated Ivanpah 3 proposal that includes elimination of one emergency generator and reduction in the size and usage of the Ivanpah 3 boiler to match those of Ivanpah 1 and 2. Compliance with all District rules and regulations was demonstrated to the District's satisfaction in the DOC. The District's FDOC conditions are presented in the list of mitigation measures **AQ-1** through **AQ-39** for the proposed project, in Section 4.1.4. Because the FDOC conditions for the Mitigated Ivanpah 3 and Modified I-15 Alternatives are different, the associated mitigation measures implementing these conditions would also be different. These are also presented, as mitigation measures **AQ-1** through **AQ-31**, in Section 4.1.4.

Federal

The District is responsible for issuing the federal NSR permit, the federal Title V permit, and has been delegated enforcement of the applicable New Source Performance Standard (Subparts, Da, Db, and IIII). The applicant will be required to submit a Title V permit application to the District within 12 months of commencing operation. Additionally, this project would not require a PSD permit from the EPA.

The project is located in a federal nonattainment area and requires the approval of a federal agency (BLM). Therefore, the project is subject to the general conformity regulations (40 CFR Part 93). The project area is moderate nonattainment of the federal PM10 ambient air quality standards, and the general conformity emissions applicability thresholds for this nonattainment classification is 100 tons/year of direct and indirect PM10 emissions and 100 tons/year of direct and indirect PM10 precursor (NOx and SOx) emissions. The project's maximum annual unmitigated direct and indirect emissions of PM10 during construction and operation would have the potential to exceed the 100 tons threshold, while the unmitigated NOx and SOx emissions from construction and operation would not have the potential to exceed the 100 tons/year threshold. However, the mitigated direct and indirect construction and operation emissions, as shown in **Tables 4.1-1** through **4.1-3** have been determined to be well below the applicable General Conformity applicability thresholds of 100 tons per year for PM10, SOx, and NOx. Therefore, the project is not required to complete a conformity analysis and conformance with the State Implementation Plan is assumed.

State

The applicant would demonstrate that the project would comply with Section 41700 of the California State Health and Safety Code, which restricts emissions that would cause nuisance or injury, with the issuance of the District's Final Determination of Compliance and the Energy Commission's affirmative finding for the project. In the FDOC, the

District concluded that the project should comply with this requirement as the screening health risk assessment they performed found risks to be below a Prioritization Score of 1.0, or below the need for any additional analysis or action.

The fire pump and emergency generator engines are also subject to the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines. This measure limits the types of fuels allowed, establishes maximum emission rates, and establishes recordkeeping requirements. The proposed Tier II engine meets the emission limit requirements of this rule. This measure would also limit the engine's testing and maintenance operation to 50 hours per year.

Local

The District rules and regulations specify the emissions control and offset requirements for new sources such as the ISEGS. Best Available Control Technology would be implemented, and emission reduction credits (ERCs) are not required to offset the project's emissions by District rules and regulations based on the permitted stationary source emission levels for this project. Compliance with the District's new source requirements would ensure that the project would be consistent with the strategies and future emissions anticipated under the District's air quality attainment and maintenance plans.

The applicant provided an air quality permit application to the MDAQMD in September 2007; and the District issued the PDOC on February 14, 2008 (MDAQMD 2008a), issued the FDOC on December 3, 2008 (MDAQMD 2008b), and issued three applicant requested revisions to the FDOC, Rev. A on April 9, 2009 (MDAQMD 2009a), Rev. B on July 15, 2009 (MDAQMD 2009b), and Rev. C on April 15, 2010 (MDAQMD 2010). The FDOC states that the proposed project is expected to comply with all applicable District rules and regulations. The DOC evaluates whether and under what conditions the proposed project would comply with the District's applicable rules and regulations, as described below.

Regulation II – Permits

Rule 201 and 203 – Permit to Construct and Permit to Operate

Rule 201 establishes the emission source requirements that must be met to obtain a Permit to Construct. Rule 203 prohibits use of any equipment or the use of which may emits air contaminants without obtaining Permit to Operate. The applicant has submitted all required applications; therefore, the applicant is in compliance with these rules.

Rule 221 – Federal Operating Permit Requirement

Rule 221 requires certain facilities to obtain Federal Operating Permits. Title V permitting will be required as a result of Acid Rain rule applicability for the proposed project. The applicant will be required to submit an application for a Title V permit to comply with this rule.

Regulation IV – Prohibitions

Rule 401 - Visible Emissions

This rule limits visible emissions from emissions sources, including stationary source exhausts and fugitive dust emission sources. Compliance with this rule is expected.

Rule 402 - Nuisance

This rule restricts discharge of emissions that would cause injury, detriment, annoyance, or public nuisance. The facility is expected to comply with this rule (identical to California Health and Safety Code 41700).

Rule 403 - Fugitive Dust

This rule limits fugitive emissions from certain bulk storage, earthmoving, construction and demolition, and manmade conditions resulting in wind erosion. With the implementation of mitigation measures **AQ-SC3** and **AQ-SC7,** the facility is expected to comply with this rule.

Rule 404 - Particulate Matter Concentration

Rule 404 limits PM emissions to less than 0.1 grains per standard cubic foot of gas at standard conditions. In the FDOC, the District has determined that the estimated PM emission concentrations of the proposed boilers and engines are less than 0.006 gr/dscf and 0.05 gr/dscf, respectively. These proposed emission rates are well below the limits established by this rule, therefore compliance is expected.

Rule 405 – Solid Particulate Matter Weight

Rule 405 prohibits discharge of solid particulate matter, such as lead and lead compounds, into the atmosphere. The ISEGS is expected to operate in compliance with this rule.

Rule 406 – Specific Contaminants

Rule 406 prohibits discharge of sulfur compounds, calculated as SO_2, in excess of 0.05 percent by volume (500 ppmv), and acid gas emissions above specified levels. SO_2 emissions from the propose project would be below 0.5 ppmv, based on the fuel sulfur content limit of 0.75 gr/100 scf. Compliance is expected.

Rule 407 – Liquid and Gaseous Air Contaminants

Rule 407 prohibits discharge of CO in excess of 2,000 ppmv. The CO emissions from the boilers, firewater pumps, and emergency generator engines would be well below 2,000 ppmv in compliance with this rule.

Rule 431 – Sulfur Content of Fuels

Rule 431 prohibits the burning of gaseous fuel with sulfur content in excess of 800 ppm and liquid fuel with a sulfur content of more than 0.5 percent sulfur by weight. With the requirement of utility grade natural gas for the boilers and the requirement of ARB ultra-low sulfur diesel fuel, ISEGS would operate in compliance with this rule.

Rule 463 – Storage of Organic Liquids

This rule is to limit the emissions of VOC and toxic compounds during the storage of organic liquid. This rule sets standards for storage of organic liquids with a true vapor pressure of 1.5 pounds per square inch or greater. The project is proposing a diesel storage tank but no gasoline storage tank or other organic liquid with a true vapor pressure of 1.5 pounds per square inch or greater; therefore, the requirements of this rule do not apply.

Rule 475 – Electric Power Generating Equipment

Rule 475 limits emissions of NOx and PM from electric generating equipment, and this rule is applicable to the emergency engine of the proposed project. This rule limits NOx and PM emission no more than 160 ppmv, and 0.01 gr/dscf at 3 percent O_2. Compliance is expected with the proposed Tier II emergency diesel engines.

Regulation IX – Standards of Performance for New Stationary Sources

Rule 900 – Standard of Performance For New Stationary Source (NSPS)

This rule incorporates the Federal NSPS (40 CFR 60) rules by reference. The District evaluated compliance with Subpart Da that applies to the ISEGS 3 boiler and Subpart Db that applies to the ISEGS 1 and 2 boilers and has provided conditions they believe ensure compliance with these regulations. However, two specific exhaust monitoring requirements required by Subparts Da and Db, NO_2 monitoring for the ISEGS 1 and 2 boilers and oxygen monitoring for the ISEGS 3 boiler, may need to be clarified, or revised conditions added to the boiler permits, prior to construction of the boilers. BLM has added verification language that will require the project owner make a clear determination regarding these monitoring requirements.

The proposed Tier II engines meet the emission limit requirements of the NSPS ((Subpart IIII) that applies to the proposed ISEGS emergency generators engines; however, the NSPS (Table 4) requires that the fire pump engines meet regulatory stationary IC equivalent engine emission requirements (Tier III) by 2009 model years. Therefore, a mitigation measure insuring that engines meet the latest ARB/EPA emission standards when they are purchased in included.

Regulation XIII – New Source Review

Rule 1303 – New Source Review

This rule requires implementation of BACT for any emission source unit that emits or has the potential to emit 25 lbs/day or more, and emission offsets if total facility emissions exceed annual thresholds. The District permits limit the emissions from each source to less than 25 lbs/day, so BACT is not applicable; and the permits limit the total site annual emission below offset thresholds, so offsets are not applicable.

Rule 1306 – Electric Energy Generating Facilities

Describes actions to be taken for permitting of power plants. The District has issued a PDOC and an FDOC in compliance with the requirements of this rule.

4.1.4 Mitigation Measures

As discussed in Section 4.0, the mitigation measures presented below constitute a combination of measures proposed by the applicant, Conditions of Certification recommended by Energy Commission staff, state and local regulatory requirements, and additional measures (if any) identified by BLM in the development of this FEIS. Table 4.0-1 in Section 4.0 indicates the source and regulatory authority for each of the measures.

AQ-SC1 Air Quality Construction Mitigation Manager (AQCMM): The project owner shall designate and retain an on-site AQCMM who shall be responsible for directing and documenting compliance with Conditions of Certification **AQ-SC3**, **AQ-SC4** and **AQ-SC5** for the entire project site and linear facility construction. The on-site AQCMM may delegate responsibilities to one or more AQCMM Delegates. The AQCMM and AQCMM Delegates shall have full access to all areas of construction on the project site and linear facilities, and shall have the authority to stop any or all construction activities as warranted by applicable construction mitigation conditions. The AQCMM and AQCMM Delegates may have other responsibilities in addition to those described in this condition. The AQCMM shall not be terminated without written consent of the Compliance Project Manager (CPM).

Verification: At least 60 days prior to the start of ground disturbance, the project owner shall submit to the BLM's Authorized Officer and CPM for approval, the name, resume, qualifications, and contact information for the on-site AQCMM and all AQCMM Delegates.

AQ-SC2 Air Quality Construction Mitigation Plan (AQCMP): The project owner shall provide an AQCMP, for approval, which details the steps that will be taken and the reporting requirements necessary to ensure compliance with Conditions of Certification **AQ-SC3**, **AQ-SC4,** and **AQ-SC5**.

Verification: At least 60 days prior to the start of any ground disturbance, the project owner shall submit the AQCMP to the BLM's Authorized Officer and CPM for approval. The AQCMP shall include effectiveness and environmental data for the proposed soil stabilizer. The BLM's Authorized Officer or CPM will notify the project owner of any necessary modifications to the plan within 30 days from the date of receipt.

AQ-SC3 Construction Fugitive Dust Control: The AQCMM shall submit documentation to the BLM's Authorized Officer and CPM in each Monthly Compliance Report that demonstrates compliance with the AQCMP mitigation measures for the purposes of preventing all fugitive dust plumes from leaving the project. Any deviation from the AQCMP mitigation measures shall require prior BLM Authorized Officer and CPM notification and approval.

Verification: The AQCMM shall provide the BLM's Authorized Officer and the CPM a Monthly Compliance Report (**COMPLIANCE-6**) to include the following to demonstrate control of fugitive dust emissions:

A. a summary of all actions taken to maintain compliance with this condition;

B. copies of any complaints filed with the District in relation to project construction; and

C. any other documentation deemed necessary by the BLM Authorized Officer, CPM, and AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

The following fugitive dust mitigation measures shall be included in the AQCMP required by **AQ-SC2**.

a. The main access roads through the facility to the power block areas will be either paved or stabilized using soil binders, or equivalent methods, to provide a stabilized surface that is similar for the purposes of dust control to paving, that may or may not include a crushed rock (gravel or similar material with fines removed) top layer, prior to initiating construction in the main power block area, and delivery areas for operations materials (chemicals, replacement parts, etc.) will be paved prior to taking initial deliveries.

b. All unpaved construction roads and unpaved operational site roads, as they are being constructed, shall be stabilized with a non-toxic soil stabilizer or soil weighting agent that can be determined to be both as efficient or more efficient for fugitive dust control as ARB approved soil stabilizers, and shall not increase any other environmental impacts including loss of vegetation. All other disturbed areas in the project and linear construction sites shall be watered as frequently as necessary during grading; and after active construction activities shall be stabilized with a non-toxic soil stabilizer or soil weighting agent, or alternative approved soil stabilizing methods, in order to comply with the dust mitigation objectives of Condition of Certification **AQ-SC4**. The frequency of watering can be reduced or eliminated during periods of precipitation.

c. No vehicle shall exceed 10 miles per hour on unpaved areas within the construction site, with the exception that vehicles may travel up to 25 miles per hour on stabilized unpaved roads as long as such speeds do not create visible dust emissions.

d. Visible speed limit signs shall be posted at the construction site entrances.

e. All construction equipment vehicle tires shall be inspected and washed as necessary to be cleaned free of dirt prior to entering paved roadways.

f. Gravel ramps of at least 20 feet in length must be provided at the tire washing/cleaning station.

g. All unpaved exits from the construction site shall be graveled or treated to prevent track-out to public roadways.

h. All construction vehicles shall enter the construction site through the treated entrance roadways, unless an alternative route has been submitted to and approved by the CPM and BLM Authorized Officer.

i. Construction areas adjacent to any paved roadway below the grade of the surrounding construction area or otherwise directly impacted by sediment from site drainage shall be provided with sandbags or other equivalently effective

measures to prevent run-off to roadways, or other similar run-off control measures as specified in the SWPPP, only when such SWPPP measures are necessary so that this condition does not conflict with the requirements of the SWPPP.

j. All paved roads within the construction site shall be swept daily or as needed (less during periods of precipitation) on days when construction activity occurs to prevent the accumulation of dirt and debris.

k. At least the first 500 feet of any paved public roadway exiting the construction site or exiting other unpaved roads en route from the construction site or construction staging areas shall be swept as needed (less during periods of precipitation) on days when construction activity occurs or on any other day when dirt or runoff resulting from the construction site activities is visible on the public paved roadways.

l. All soil storage piles and disturbed areas that remain inactive for longer than 10 days shall be covered, or shall be treated with appropriate dust suppressant compounds.

m. All vehicles that are used to transport solid bulk material on public roadways and that have potential to cause visible emissions shall be provided with a cover, or the materials shall be sufficiently wetted and loaded onto the trucks in a manner to provide at least one foot of freeboard.

n. Wind erosion control techniques (such as windbreaks, water, chemical dust suppressants, and/or vegetation) shall be used on all construction areas that may be disturbed. Any windbreaks installed to comply with this condition shall remain in place until the soil is stabilized or permanently covered with vegetation.

AQ-SC4 Dust Plume Response Requirement: The AQCMM or an AQCMM Delegate shall monitor all construction activities for visible dust plumes. Observations of visible dust plumes that have the potential to be transported (A) off the project site and within 400 feet upwind of any regularly occupied structures not owned by the project owner or (B) 200 feet beyond the centerline of the construction of linear facilities indicate that existing mitigation measures are not resulting in effective mitigation. The AQCMP shall include a section detailing how the additional mitigation measures will be accomplished within the time limits specified. The AQCMM or Delegate shall implement the following procedures for additional mitigation measures in the event that such visible dust plumes are observed:

Step 1: The AQCMM or Delegate shall direct more intensive application of the existing mitigation methods within 15 minutes of making such a determination.

Step 2: The AQCMM or Delegate shall direct implementation of additional methods of dust suppression if Step 1, specified above, fails to result in adequate mitigation within 30 minutes of the original determination.

Step 3: The AQCMM or Delegate shall direct a temporary shutdown of the activity causing the emissions if Step 2, specified above, fails to result in

effective mitigation within one hour of the original determination. The activity shall not restart until the AQCMM or Delegate is satisfied that appropriate additional mitigation or other site conditions have changed so that visual dust plumes will not result upon restarting the shutdown source. The owner/operator may appeal to the CPM or BLM Authorized Officer any directive from the AQCMM or Delegate to shut down an activity, if the shutdown shall go into effect within one hour of the original determination, unless overruled by the CPM or BLM Authorized Officer before that time.

Verification: The AQCMM shall provide the BLM's Authorized Officer and the CPM a Monthly Compliance Report (**COMPLIANCE-6**) to include:

A. a summary of all actions taken to maintain compliance with this condition;

B. copies of any complaints filed with the District in relation to project construction; and

C. any other documentation deemed necessary by the CPM and AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

AQ-SC5 Diesel-Fueled Engine Control: The AQCMM shall submit to the CPM, in the Monthly Compliance Report (MCR), a construction mitigation report that demonstrates compliance with the following mitigation measures for purposes of controlling diesel construction-related emissions. Any deviation from the following mitigation measures shall require prior and CPM notification and approval.

a. All diesel-fueled engines used in the construction of the facility shall have clearly visible tags issued by the on-site AQCMM showing that the engine meets the conditions set forth herein.

b. All construction diesel engines with a rating of 50 hp or higher shall meet, at a minimum, the Tier 3 California Emission Standards for Off-Road Compression-Ignition Engines, as specified in California Code of Regulations, Title 13, section 2423(b)(1), unless a good faith effort that is certified by the on-site AQCMM demonstrates that such engine is not available for a particular item of equipment. This good faith effort shall be documented with signed written correspondence by the appropriate construction contractors along with documented correspondence with at least two construction equipment rental firms. In the event that a Tier 3 engine is not available for any off-road equipment larger than 100 hp, that equipment shall be equipped with a Tier 2 engine, or an engine that is equipped with retrofit controls to reduce exhaust emissions of NOx and diesel particulate matter (DPM) to no more than Tier 2 levels unless certified by engine manufacturers or the on-site AQCMM that the use of such devices is not practical for specific engine types. For purposes of this condition, the use of such devices is "not practical" for the following, as well as other, reasons.

a. There is no available retrofit control device that has been verified by either the California Air Resources Board or U.S. Environmental Protection Agency to control the engine in question to Tier 2 equivalent emission levels and the highest level of available control using retrofit or Tier 1 engines is being used for the engine in question; or

b. The construction equipment is intended to be on site for 5 days or less.

c. The CPM may grant relief from this requirement if the AQCMM can demonstrate a good faith effort to comply with this requirement and that compliance is not possible.

c. The use of a retrofit control device may be terminated immediately, provided that the CPM is informed within 10 working days of the termination and that a replacement for the equipment item in question meeting the controls required in item "b" occurs within 10 days of termination of the use, if the equipment would be needed to continue working at this site for more than 15 days after the use of the retrofit control device is terminated, if one of the following conditions exists:

1. The use of the retrofit control device is excessively reducing the normal availability of the construction equipment due to increased down time for maintenance, and/or reduced power output due to an excessive increase in back pressure.

2. The retrofit control device is causing or is reasonably expected to cause engine damage.

3. The retrofit control device is causing or is reasonably expected to cause a substantial risk to workers or the public.

4. Any other seriously detrimental cause which has the approval of the CPM prior to implementation of the termination.

d. All heavy earth-moving equipment and heavy duty construction-related trucks with engines meeting the requirements of (b) above shall be properly maintained and the engines tuned to the engine manufacturer's specifications.

e. All diesel heavy construction equipment shall not idle for more than five minutes. Vehicles that need to idle as part of their normal operation (such as concrete trucks) are exempted from this requirement.

f. Construction equipment will employ electric motors when feasible.

<u>**Verification:**</u> The AQCMM shall include in the Monthly Compliance Report (**COMPLIANCE-6**):

A. A summary of all actions taken to maintain compliance with this condition;

B. A list of all heavy equipment used on site during that month, including the owner of that equipment and a letter from each owner indicating that equipment has been properly maintained; and

C. Any other documentation deemed necessary by the CPM, and the AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

AQ-SC6 The project owner, when obtaining dedicated vehicles for mirror washing activities and other facility maintenance activities, shall only obtain new model year vehicles that meet California on-road vehicle emission standards for the model year when obtained.

Other vehicle/fuel types may be allowed assuming that the emission profile for those vehicles, including fugitive dust generation emissions, is comparable to the vehicles types identified in this condition.

Verification: At least 60 days prior to the start commercial production, the project owner shall submit to the CPM a copy of the plan that identifies the size and type of the on-site vehicle and equipment fleet and the vehicle and equipment purchase orders and contracts and/or purchase schedule. The plan shall be updated every other year and submitted in the Annual Compliance Report (**COMPLIANCE-7**).

AQ-SC7 The project owner shall provide a site Operations Dust Control Plan, including all applicable fugitive dust control measures identified in the verification of **AQ-SC3** that would be applicable to reducing fugitive dust from ongoing operations~~;~~ that:

A. describes the active operations and wind erosion control techniques such as windbreaks and chemical dust suppressants, including their ongoing maintenance procedures, that shall be used on areas that could be disturbed by vehicles or wind anywhere within the project boundaries; and

B. identifies the location of signs throughout the facility that will limit traveling on unpaved portion of roadways to solar equipment maintenance vehicles only. In addition, vehicle speed shall be limited to no more than 10 miles per hour on these unpaved roadways, with the exception that vehicles may travel up to 25 miles per hour on stabilized unpaved roads as long as such speeds do not create visible dust emissions.

The site operations fugitive dust control plan shall include the use of durable non-toxic soil stabilizers on all regularly used unpaved roads and disturbed off-road areas, or alternative methods for stabilizing disturbed off-road areas, within the project boundaries, and shall include the inspection and maintenance procedures that will be undertaken to ensure that the unpaved roads remain stabilized. The soil stabilizer used shall be a non-toxic soil stabilizer or soil weighting agent that can be determined to be both as efficient or more efficient for fugitive dust control as ARB approved soil stabilizers, and shall not increase any other environmental impacts including loss of vegetation.

The performance and application of the fugitive dust controls shall also be measured against and meet the performance requirements of condition **AQ-SC4**. The performance requirements of **AQ-SC4** shall also be included in the Operations Dust Control Plan.

Verification: At least 60 days prior to start of commercial operation, the project owner shall submit to the BLM's Authorized Officer and the CPM for review and approval a copy of the site_Operations Dust Control Plan that identifies the dust and erosion control procedures, including effectiveness and environmental data for the proposed soil stabilizer, that will be used during operation of the project and that identifies all locations of the speed limit signs. At least 60 days after commercial operation, the project owner shall provide to the BLM's Authorized Officer and the CPM a report identifying the locations of all speed limit signs, and a copy of the project employee and contractor training manual that clearly identifies that project employees and contractors are required to comply with the dust and erosion control procedures and on-site speed limits.

AQ-SC8 The project owner shall provide the CPM copies of all District issued Authority-to-Construct (ATC) and Permit-to-Operate (PTO) for the facility.

The project owner shall submit to the CPM for review and approval any modification proposed by the project owner to any project air permit. The project owner shall submit to the CPM any modification to any permit proposed by the District or U.S. Environmental Protection Agency (EPA), and any revised permit issued by the District or EPA, for the project.

Verification: The project owner shall submit any ATC, PTO, and proposed air permit modification to the CPM within 5 working days of its submittal either by 1) the project owner to an agency, or 2) receipt of proposed modifications from an agency. The project owner shall submit all modified air permits to the CPM within 15 days of receipt.

AQ-SC9 The emergency generator and fire pump engines procured for this project will meet or exceed the NSPS Subpart IIII emission standards for the model year that corresponds to their date of purchase.

Verification: The project owner shall submit the emergency engine specifications to the CPM at least 30 days prior to purchasing the engines for review and approval.

AQ-SC10 The ISEGS 1, ISEGS 2, and ISEGS 3 boilers shall not exceed a total annual natural gas fuel heat input that is more than 5 percent of the total annual heat input from the sun for ISEGS1, ISEGS2, and ISEGS 3, respectively.

Verification: Annual natural gas fuel heat input data and annual solar heat input data for the ISEGS 1, ISEGS 2, and ISEGS 3 units showing compliance with this condition shall be provided in the Annual Compliance Report (**COMPLIANCE-7**).

District Conditions of Certification

District conditions **AQ-1** through **AQ-39** are CEQA-only required conditions.

Conditions Applicable to Ivanpah 1 & 2 Boilers, MDAQMD Application Numbers/Permit Numbers; 00009311 (B010375) & 00009314 (B010376)

Equipment Description:

Nebraska boilers, Model NSX-G-120, each equipped with Natcom Low-NOx Burners rated at a maximum heat input of 231.1 MMBTU/hr, and flue gas recirculation (FGR or EGR) operating at 13.9 percent excess air, fueled exclusively on utility grade natural gas. Equipment boiler is equipped with stacks that are 130 feet high and 60 inches in diameter.

These conditions apply separately to both boilers unless otherwise specified.

AQ-1 Operation of this equipment must be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.

Verification: Any non-compliant operations shall be listed in the Annual Compliance Report (**COMPLIANCE-7**).

AQ-2 The owner/operator shall operate this equipment in strict accord with the recommendations of the manufacturer or supplier and/or sound engineering principles and consistent with all information submitted with the application for this permit, which produce the minimum emission of air contaminants.

Verification: As part of the Annual Compliance Report (**COMPLIANCE-7**), the project owner shall include information on the date, time, and duration of any violation of this permit condition.

AQ-3 This boiler shall use only natural gas as fuel and shall be equipped with a meter measuring fuel consumption in standard cubic feet.

Verification: As part of the Annual Compliance Report (**COMPLIANCE-7**), the project owner shall include proofs that only pipeline quality or Public Utility Commission regulated natural gas are used for the boilers.

AQ-4 The owner owner/operator shall maintain a current, on-site (at a central location if necessary) log for this equipment for five (5) years, which shall be provided to District, state or federal personnel upon request. This log shall include calendar year fuel use for this equipment in standard cubic feet, or BTU's, and daily hours of operation.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or Energy Commission staff.

AQ-5 Not later than 180 days after initial startup, the operator shall perform an initial compliance test on this boiler in accordance with the District Compliance Test Procedural Manual. This test shall demonstrate that this equipment does not exceed the following emission maximums:

Pollutant	ppmvd	Lb/MMBtu	Lb/hr	
*NOx	9.0	0.011	2.5	(per USEPA Methods 19 and 20)
SOx	1.7	0.003	0.6	
*CO	25.0	0.018	4.2	(per USEPA Methods 10)
VOC	12.6	0.0054	1.2	(per USEPA Methods 25A and 18)
PM10	n/a	0.007	1.7	(per USEPA Methods 5 and 202 or CARB Method 5)

*corrected to 3% oxygen, on a dry basis, averaged over one hour

Verification: The project owner shall notify the District and the CPM within fifteen (15) working days before the execution of the compliance test required in this condition. The test results shall be submitted to the District and to the CPM within 60 days of the date of the tests.

AQ-6 This boiler shall be operated in compliance with all applicable requirements of 40 CFR 60 Subpart Db - Standards of Performance for Industrial Steam Generating Units (NSPS Db).

Verification: The project owner shall complete and submit to the CPM a compliance plan that provides a list of the 40 CFR 60 Subpart Db plans, tests, and recordkeeping requirements and their compliance schedule dates as applicable for the ISEGS Boilers 1 and 2 at least 30 days prior to first fire of the boilers or earlier as necessary for compliance with Subpart Db.

AQ-7 Records of fuel supplier certifications of fuel sulfur content shall be maintained to demonstrate compliance with the sulfur dioxide and particulate matter emission limits.

Verification: Complying with Condition of Certification AQ-3 shall be used to demonstrate compliance with this condition.

AQ-8 The owner/operator shall continuously monitor fuel flow rate and flue gas oxygen level.

Verification: At least 120 days prior to construction of the boiler stacks, the project owner shall provide the District for approval, and the CPM for review, a detailed drawing and a plan on how the measurements and recordings, required by this condition, will be performed by the chosen monitoring system.

AQ-9 The owner/operator shall conduct an initial compliance test for NOx emissions within 180 days of startup. This initial compliance test shall be used to develop a relationship between fuel firing rate, flue gas oxygen, and flue gas NOx concentration. This relationship shall be used to determine compliance with NOx emission limits contained in these conditions.

Verification: The project owner shall notify the District and the CPM within fifteen (15) working days before the execution of the compliance test required in this condition. The test results shall be submitted to the District and to the CPM within 60 days of the date of the tests.

AQ-10 The owner/operator shall comply with all applicable recordkeeping and reporting requirements of NSPS Db.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-11 This boiler shall not operate more than 4 hours in any single day, and no more than 1460 hours in any calendar year.

a. These limits shall not apply during the facility commissioning period. The commissioning period shall begin the first time fuel is fired in the boiler. The commissioning period shall end when the facility achieves commercial operation, but no later than 180 days after first fire.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

Conditions Applicable to Ivanpah 3 Boiler, MDAQMD Application Number; 00009320

Equipment Description:

Babcock-Wilcox boiler, Model unknown, equipped with an unknown Low-NOx Burner rated at a maximum heat input of 462.2 MMBTU/hr, and flue gas recirculation (FGR or EGR) operating at 13.9 percent excess air, fueled exclusively on utility grade natural gas. Equipment shall use 450,000 cu-ft/hr of fuel and provide 440,000 lb/hr of steam. This boiler is equipped with a stack that is 130 feet high and 60 inches in diameter.

AQ-12 Operation of this equipment must be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.

Verification: Any non-compliant operations shall be listed in the Annual Compliance Report (**COMPLIANCE-7**).

AQ-13 The owner/operator shall operate this equipment in strict accord with the recommendations of the manufacturer or supplier and/or sound engineering principles and consistent with all information submitted with the application for this permit, which produce the minimum emission of air contaminants.

Verification: As part of the Annual Compliance Report, (**COMPLIANCE-7**) the project owner shall include information on the date, time, and duration of any violation of this permit condition.

AQ-14 This boiler shall use only natural gas as fuel and shall be equipped with a meter measuring fuel consumption in standard cubic feet.

Verification: As part of the Annual Compliance Report (**COMPLIANCE-7**), the project owner shall include proofs that only pipeline quality or Public Utility Commission regulated natural gas are used for the boilers.

AQ-15 The owner owner/operator shall maintain a current, on-site (at a central location if necessary) log for this equipment for five (5) years, which shall be provided to District, state or federal personnel upon request. This log shall include calendar year fuel use for this equipment in standard cubic feet, or BTU's, and daily hours of operation.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or Energy Commission staff.

AQ-16 Not later than 180 days after initial startup, the operator shall perform an initial compliance test on this boiler in accordance with the District Compliance Test Procedural Manual. This test shall demonstrate that this equipment does not exceed the following emission maximums:

Pollutant	ppmvd	Lb/MMBTU	Lb/hr	
*NOx	9.0	0.011	5	(per USEPA Methods 19 and 20)
SOx	1.7	0.003	1.3	
*CO	25.0	0.018	8.5	(per USEPA Methods 10)
VOC	12.6	0.0054	2.5	(per USEPA Methods 25A and 18)
PM10	n/a	0.007	3.4	(per USEPA Methods 5 and 202 or CARB Method 5)

*corrected to 3% oxygen, on a dry basis, averaged over one hour

Verification: The project owner shall notify the District and the CPM within fifteen (15) working days before the execution of the compliance test required in this condition. The test results shall be submitted to the District and to the CPM within 60 days of the date of the tests.

AQ-17 This boiler shall be operated in compliance with all applicable requirements of 40 CFR 60 Subpart Da - Standards of Performance for Industrial Steam Generating Units (NSPS Da).

Verification: The project owner shall complete and submit to the CPM a compliance plan that provides a list of the 40 CFR 60 Subpart Da plans, tests, and recordkeeping requirements and their compliance schedule dates as applicable for the ISEGS Boiler 3 at least 30 days prior to first fire of the boiler or earlier as necessary for compliance with Subpart Da.

AQ-18 Records of fuel supplier certifications of fuel sulfur content shall be maintained to demonstrate compliance with the sulfur dioxide and particulate matter emission limits.

Verification: Complying with Condition of Certification **AQ-14** shall be used to demonstrate compliance with this condition.

AQ-19 The owner/operator shall install, calibrate, maintain and operate a continuous emissions monitoring system (CEMS) to measure and record NOx emissions and oxygen concentration according to 40 CFR Part 60 specifications.

Verification: At least 120 days prior to construction of the boiler stacks, the project owner shall provide the District for approval and the CPM for review, a detailed drawing and a plan on how the measurements and recordings, required by this condition, will be performed by the chosen monitoring system.

AQ-20 The owner/operator shall conduct an initial compliance test for NOx emissions by conducting the CEMS RATA test within 180 days of startup; and shall collect data from the CEMS at all times that fuel is combusted in the boiler.

Verification: The project owner shall notify the District and the CPM within fifteen (15) working days before the execution of the compliance test required in this condition.

The test results shall be submitted to the District and to the CPM within 60 days of the date of the tests.

AQ-21 The owner/operator shall comply with all applicable recordkeeping and reporting requirements of NSPS Da.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-22 This boiler shall not operate more than 4 hours in any single day, and no more than 1460 hours in any calendar year.

a. These limits shall not apply during the facility commissioning period. The commissioning period shall begin the first time fuel is fired in the boiler. The commissioning period shall end when the facility achieves commercial operation, but no later than 180 days after first fire.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

Conditions Applicable to Ivanpah I, II, and III Emergency Fire Pumps, MDAQMD Application Numbers/Permit Numbers; 00009312 (E010380), 00009315 (E010378), and 00009319 (E010384)

Equipment Description:

Year of Manufacture 2008, Tier II, One Clarke, Diesel fired internal combustion engine, Model No. JU6H-UF62, and Serial number tbd, After Cooled, Direct Injected, Turbo Charged, producing 240 bhp with 6 cylinders at 2,600 rpm while consuming a maximum of 10 gal/hr. This equipment powers a pump.

These conditions apply separately to all three emergency fire pump engines unless otherwise specified.

AQ-23 This system shall be installed, operated and maintained in strict accord with those recommendations of the manufacturer/supplier and/or sound engineering principles which produce the minimum emissions of contaminants. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-24 These engines may operate in response to notification of impending rotating outage if the area utility has ordered rotating outages in the area where the engines are located or expects to order such outages at a particular time, the engines are located in the area subject to the rotating outage, the engines are operated no more than 30 minutes prior to the forecasted outage, and the engines are shut down immediately after the utility advises that the outage is no longer imminent or in effect.

<u>Verification:</u> During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-25 These engines may operate in response to fire suppression requirements and needs.

<u>Verification:</u> During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-26 These units shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis per CARB Diesel or equivalent requirements.

<u>Verification:</u> During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-27 A non-resettable four-digit (9,999) hour timer shall be installed and maintained on these units to indicate elapsed engine operating time.

<u>Verification:</u> At least thirty (30) days prior to the installation of the engine, the project owner shall provide the District and the CPM the specification of the hour timer.

AQ-28 These units shall be limited to use for emergency power, defined as in response to a fire or when commercially available power has been interrupted. In addition, this unit shall be operated no more than 50 hours per year for testing and maintenance, excluding compliance source testing. Time required for source testing will not be counted toward the 50 hour per year limit.

<u>Verification:</u> During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-29 The hour limit of **AQ-28** can be exceeded when the emergency fire pump assemblies are driven directly by a stationary diesel fueled CI engine when operated per and in accord with the NFPA 25 - "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," 2006 edition or the most current edition approved by the CARB Executive Officer. {Title 17 CCR 93115(c)16}

<u>Verification:</u> During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-30 The owner/operator shall maintain a operations log for these units current and on-site, either at the engine location or at a on-site location, for a minimum of two (2) years, and for another year where it can be made available to the District staff within 5 working days from the District's request, and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below:

a. Date of each use and duration of each use (in hours);
b. Reason for use (testing & maintenance, emergency, required emission testing);

c. Calendar year operation in terms of fuel consumption (in gallons) and total hours; and,

d. Fuel sulfur concentration (the owner/operator may use the supplier's certification of sulfur content if it is maintained as part of this log).

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-31 These fire protection units are subject to the requirements of the ATCM for Stationary Compression Ignition Engines (Title 17 CCR 93115). In the event of conflict between these conditions and the ATCM, the more stringent requirements shall govern.

Verification: Not necessary.

Conditions Applicable to Ivanpah I, II, and III Emergency Generators, MDAQMD Application Numbers/Permit Numbers; 00009313 (E010381), 00009316 (E010379), 00009317 (E010382) and 00009318 (E010383)

Equipment Description:

Year of Manufacture 2008, Tier II, One Caterpillar, Diesel fired internal combustion engine, Model No. 3516C-HD, and Serial No. tbd, After Cooled, Direct Injected, Turbo Charged, producing 3,750 bhp with 16 cylinders at 1,800 rpm while consuming a maximum of 173 gal/hr. This equipment powers a Generator.

These conditions apply separately to all four emergency generator engines unless otherwise specified.

AQ-32 Engine may operate in response to notification of impending rotating outage if the area utility has ordered rotating outages in the area where the engine is located or expects to order such outages at a particular time, the engine is located in the area subject to the rotating outage, the engine is operated no more than 30 minutes prior to the forecasted outage, and the engine is shut down immediately after the utility advises that the outage is no longer imminent or in effect.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-33 This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis per CARB Diesel or equivalent requirements.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-34 This equipment shall be installed, operated and maintained in strict accord with those recommendations of the manufacturer/supplier and/or sound engineering principles which produce the minimum emissions of contaminants. Unless otherwise noted, this equipment shall also be operated

in accordance with all data and specifications submitted with the application for this permit.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-35 A non-resettable four-digit (9,999) hour timer shall be installed and maintained on this unit to indicate elapsed engine operating time.

Verification: At least thirty (30) days prior to the installation of the engine, the project owner shall provide the District and the CPM the specification of the hour timer.

AQ-36 This unit shall be limited to use for emergency power, defined as in response to a fire or when commercially available power has been interrupted. In addition, this unit shall be operated no more than 50 hours per year, and no more than 0.5 hours per day for testing and maintenance, excluding compliance source testing. Time required for source testing will not be counted toward the 50 hour per year limit.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-37 The owner/operator shall maintain an operations log for this unit current and on-site (or at a central location) for a minimum of five (5) years, and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below:

a. Date of each use and duration of each use (in hours);

b. Reason for use (testing & maintenance, emergency, required emission testing);

c. Calendar year operation in terms of fuel consumption (in gallons) and total hours; and,

d. Fuel sulfur concentration (the owner/operator may use the supplier's certification of sulfur content if it is maintained as part of this log).

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-38 This genset is subject to the requirements of the ATCM for Stationary Compression Ignition Engines (Title 17 CCR 93115). In the event of conflict between these conditions and the ATCM, the more stringent requirements shall govern.

Verification: Not necessary.

AQ-39 This unit shall not be used to provide power during a voluntary agreed to power outage and/or power reduction initiated under an Interruptible Service Contract (ISC); Demand Response Program (DRP); Load Reduction Program (LRP) and/or similar arrangement(s) with the electrical power supplier.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

Mitigated Ivanpah 3 and Modified I-15 Alternatives

On April 15, 2010, the MDAQMD issued Revision C of the FDOC. The MDAQMD issued this revision to the FDOC primarily to reflect equipment changes associated with the applicant's Mitigated Ivanpah 3 proposal that includes elimination of one emergency generator and reduction in the size and usage of the Ivanpah 3 boiler to match those of Ivanpah 1 and 2. The effect of this revision is to modify the District's permit requirements, which are the basis for mitigation measures **AQ-1** to **AQ-39** above. The revised mitigation measures, which would be applicable only if the Mitigated Ivanpah 3 or Modified I-15 Alternative were implemented, are as follows:

Conditions Applicable to Ivanpah 1, 2, and 3 Boilers, MDAQMD Application Numbers/Permit Numbers; 00009311 (B010375), 00009314 (B010376), and 00009320 (B010377)

Equipment Description:

Nebraska boilers, Model NSX-G-120, each equipped with Natcom Low-NOx Burners rated at a maximum heat input of 231.1 MMBTU/hr, and flue gas recirculation (FGR or EGR) operating at 13.9 percent excess air, fueled exclusively on utility grade natural gas. Equipment shall use no more than 225,000 cu-ft/hr of fuel and provide 220,000 lb/hr of steam. Each boiler is equipped with a stack that is 130 feet high and 40 inches in diameter.

These conditions (AQ-1 through AQ-12) apply separately to each boiler unless otherwise specified.

AQ-5 Not later than 180 days after initial startup, the operator shall perform an initial compliance test on this boiler in accordance with the District Compliance Test Procedural Manual. This test shall demonstrate that this equipment does not exceed the following emission maximums:

Pollutant	ppmvd	Lb/MMBtu	Lb/hr	
*NOx	9.0	0.011	2.5	(per USEPA Methods 19 and 20)
SOx	1.7	0.003	0.6	
*CO	25.0	0.018	4.2	(per USEPA Methods 10)
VOC	12.6	0.0054	1.2	(per USEPA Methods 25A and 18)
PM10	n/a	0.007	1.7	(per USEPA Methods 5 and 202 or CARB Method 5)

*corrected to 3% oxygen, on a dry basis, averaged over one hour
Opacity shall be conducted per Method 9; Flue gas flow rate shall be quantified in dscf per USEPA Methods 1 through 5

<u>**Verification:**</u> The project owner shall notify the District and the CPM within fifteen (15) working days before the execution of the compliance test required in this condition. The test results shall be submitted to the District and to the CPM within 60 days of the date of the tests.

AQ-6 The owner/operator shall perform annual compliance tests in accordance with the District Compliance Test Procedural Manual. Prior to performing these annual tests, the boiler shall be tuned in accord with the manufacturer's specified tune-up procedure, by a qualified technician. Subsequent tests shall

demonstrate that this equipment does not exceed the following emission maximums:

Pollutant	ppmvd	Lb/MMBtu	Lb/hr	
*NOx	9.0	0.011	2.5	(per USEPA Methods 19 and 20)
SOx	1.7	0.003	0.6	
*CO	25.0	0.018	4.2	(per USEPA Methods 10)
VOC	12.6	0.0054	1.2	(per USEPA Methods 25A and 18)
PM10	n/a	0.007	1.7	(per USEPA Methods 5 and 202 or CARB Method 5)

*corrected to 3% oxygen, on a dry basis, averaged over one hour
Opacity shall be conducted per Method 9; Flue gas flow rate shall be quantified in dscf per USEPA Methods 1 through 5

AQ-7: This boiler shall be operated in compliance with all applicable requirements of 40 CFR 60 Subpart Db - Standards of Performance for Industrial – Commercial-Institutional Steam Generating Units (NSPS Db).

Verification: The project owner shall complete and submit to the CPM a compliance plan that provides a list of the 40 CFR 60 Subpart Db plans, tests, and recordkeeping requirements and their compliance schedule dates as applicable for the ISEGS Boilers 1, 2 and 3 at least 30 days prior to first fire of the boilers or earlier as necessary for compliance with Subpart Db.

AQ-8: Records of fuel supplier certifications of fuel sulfur content shall be maintained to demonstrate compliance with the sulfur dioxide and particulate matter emission limits.

Verification: Complying with Condition of Certification **AQ-3** shall be used to demonstrate compliance with this condition.

AQ-9 The owner/operator shall continuously monitor and record fuel flow rate and flue gas oxygen level.

Verification: At least 120 days prior to construction of the boiler stacks, the project owner shall provide the District for approval, and the CPM for review, a detailed drawing and a plan on how the measurements and recordings, required by this condition, will be performed by the chosen monitoring system.

AQ-10 In lieu of installing CEMs to monitor NOx emissions, and pursuant to 40 CFR 60 Subpart Db, Section 60.49b(c), the owner/operator shall monitor boiler operating conditions and estimate NOx emission rates per a District approved emissions estimation plan. The plan shall be based on the initial source tests as required by condition AQ-5, and annually pursuant to condition AQ-6. The plan shall include test results, operating parameters, analysis, conclusions and proposed NOx estimating relationship consistent with established emission chemistry and operational effects.

Verification: This initial plan shall be submitted to the District for approval, and the CPM for review, within 360 days of the initial startup. Any proposed changes to a District-approved plan shall include subsequent test results, operating parameters, analysis, and any other pertinent information to support the proposed changes. The District must approve any emissions estimation plan or revision for estimated NOx emissions to be considered valid.

AQ-11 The owner/operator shall comply with all applicable recordkeeping and reporting requirements of NSPS Db.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-12 This boiler shall not burn more than 0.9 MMSCF of natural gas in any single day, and no more than 328 MMSCF in any calendar year.

a. These limits shall not apply during the facility commissioning period. The commissioning period shall begin the first time fuel is fired in the boiler. The commissioning period shall end when the facility achieves commercial operation, but no later than 180 days after first fire.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

Conditions Applicable to Ivanpah I, II, and III Emergency Fire Pumps, MDAQMD Application Numbers/Permit Numbers; 00009312 (E010380), 00009315 (E010378), and 00009319 (E010384)

Equipment Description:

Year of Manufacture 2010, Tier III, One Clarke, Diesel fired internal combustion engine, Model No. JU6H-UF62, and Serial number tbd, After Cooled, Direct Injected, Turbo Charged, producing 240 bhp with 6 cylinders at 2,600 rpm (or equiv.) while consuming a maximum of 10 gal/hr. This equipment powers a pump.

These conditions (AQ-13 through AQ-22) apply separately to all three emergency fire pump engines unless otherwise specified.

AQ-13 This system shall be installed, operated and maintained in strict accord with those recommendations of the manufacturer/supplier and/or sound engineering principles which produce the minimum emissions of contaminants. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-14 These engines may operate in response to notification of impending rotating outage if the area utility has ordered rotating outages in the area where the engines are located or expects to order such outages at a particular time, the engines are located in the area subject to the rotating outage, the engines are operated no more than 30 minutes prior to the forecasted outage, and the engines are shut down immediately after the utility advises that the outage is no longer imminent or in effect.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-15 These engines may operate in response to fire suppression requirements and needs.

__Verification:__ During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-16 These units shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis per CARB Diesel or equivalent requirements.

__Verification:__ During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-17 A non-resettable four-digit (9,999) hour timer shall be installed and maintained on these units to indicate elapsed engine operating time.

__Verification:__ At least thirty (30) days prior to the installation of the engine, the project owner shall provide the District and the CPM the specification of the hour timer.

AQ-18 These units shall be limited to use for emergency power, defined as in response to a fire or when commercially available power has been interrupted. In addition, this unit shall be operated no more than 50 hours per year for testing and maintenance, excluding compliance source testing. Time required for source testing will not be counted toward the 50 hour per year limit.

__Verification:__ During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-19 The hour limit of **AQ-18** can be exceeded when the emergency fire pump assemblies are driven directly by a stationary diesel fueled CI engine when operated per and in accord with the NFPA 25 - "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," 2006 edition or the most current edition approved by the CARB Executive Officer. {Title 17 CCR 93115(c)16}

__Verification:__ During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-20 The owner/operator shall maintain a operations log for these units current and on-site, either at the engine location or at a on-site location, for a minimum of two (2) years, and for another year where it can be made available to the District staff within 5 working days from the District's request, and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below:

a. Date of each use and duration of each use (in hours);
b. Reason for use (testing & maintenance, emergency, required emission testing);
c. Calendar year operation in terms of fuel consumption (in gallons) and total hours;

d. Fuel sulfur concentration (the owner/operator may use the supplier's certification of sulfur content if it is maintained as part of this log); and

e. Documentation of maintenance as per manufacturer's recommendations and good maintenance practices.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-21 These fire protection units are subject to the requirements of the ATCM for Stationary Compression Ignition Engines (Title 17 CCR 93115). In the event of conflict between these conditions and the ATCM, the more stringent requirements shall govern.

Verification: Not necessary.

AQ-22 This unit is subject to the requirements of the Federal NSPS for Stationary Compression Ignition Internal Combustion Engines (40 CFR Part 60 Subpart IIII).

Verification: The project owner shall submit to the District and the CPM the engine specifications at least 30 days prior to purchasing the engines for review and approval demonstrating that the engines meet NSPS emission limit requirements at the time of engine purchase.

Conditions Applicable to Ivanpah I, II, and III Emergency Generators, MDAQMD Application Numbers/Permit Numbers; 00009313 (E010381), 00009316 (E010379), and 00009317 (E010382)

Equipment Description:

Year of Manufacture 2010, Tier II, One Caterpillar, Diesel fired internal combustion engine, Model No. 3516C-HD, and Serial No. tbd, After Cooled, Direct Injected, Turbo Charged, producing 3,750 bhp with 16 cylinders at 1,800 rpm (or equiv.) while consuming a maximum of 173 gal/hr. This equipment powers a Generator.

These conditions (AQ-23 through AQ-31) apply separately to all three emergency generator engines unless otherwise specified.

AQ-23 Engine may operate in response to notification of impending rotating outage if the area utility has ordered rotating outages in the area where the engine is located or expects to order such outages at a particular time, the engine is located in the area subject to the rotating outage, the engine is operated no more than 30 minutes prior to the forecasted outage, and the engine is shut down immediately after the utility advises that the outage is no longer imminent or in effect.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-24 This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis per CARB Diesel or equivalent requirements.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-25 This equipment shall be installed, operated and maintained in strict accord with those recommendations of the manufacturer/supplier and/or sound engineering principles which produce the minimum emissions of contaminants. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-26 A non-resettable four-digit (9,999) hour timer shall be installed and maintained on this unit to indicate elapsed engine operating time.

Verification: At least thirty (30) days prior to the installation of the engine, the project owner shall provide the District and the CPM the specification of the hour timer.

AQ-27 This unit shall be limited to use for emergency power, defined as in response to a fire or when commercially available power has been interrupted. In addition, this unit shall be operated no more than 50 hours per year, and no more than 0.5 hours per day for testing and maintenance, excluding compliance source testing. Time required for source testing will not be counted toward the 50 hour per year limit.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-28 The owner/operator shall maintain an operations log for this unit current and on-site (or at a central location) for a minimum of five (5) years, and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below:

a. Date of each use and duration of each use (in hours);

b. Reason for use (testing & maintenance, emergency, required emission testing);

c. Calendar year operation in terms of fuel consumption (in gallons) and total hours;

d. Fuel sulfur concentration (the owner/operator may use the supplier's certification of sulfur content if it is maintained as part of this log) and,

e. Documentation of maintenance as per manufacturer's recommendations and good maintenance practices.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-29 This genset is subject to the requirements of the ATCM for Stationary Compression Ignition Engines (Title 17 CCR 93115). In the event of conflict

between these conditions and the ATCM, the more stringent requirements shall govern.

Verification: Not necessary.

AQ-30 This unit shall not be used to provide power during a voluntary agreed to power outage and/or power reduction initiated under an ISC; DRP; LRP and/or similar arrangement(s) with the electrical power supplier.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

AQ-31 This unit is subject to the requirements of the Federal NSPS for Stationary Compression Ignition Internal Combustion Engines (40 CFR Part 60 Subpart IIII).

Verification: The project owner shall submit the engine specifications at least 30 days prior to purchasing the engines for review and approval demonstrating that the engines meet NSPS emission limit requirements at the time of engine purchase.

4.1.5 Summary

Potential impacts to air quality are summarized as follows:

- The project would not have the potential to exceed PSD emission levels during direct source operation and the facility is not considered a major stationary source with potential to cause adverse air quality impacts. However, without adequate fugitive dust mitigation, the project would have the potential to exceed the General Conformity PM10 applicability threshold during construction and operation, and could cause potential localized exceedances of the PM10 NAAQS during construction and operation. Mitigation measures **AQ-SC1** through **AQ-SC4**, for construction, and **AQ-SC7**, for operation, would reduce the volume of emissions, and thus reduce the potentially adverse, direct impacts and the contribution of the proposed project to indirect and cumulative impacts.
- The project would comply with applicable District Rules and Regulations, including New Source Review requirements, as required by the MDAQMD FDOC for the proposed project.
- The project's construction activities would likely contribute to adverse PM10 and ozone impacts. Mitigation measures **AQ-SC1** to **AQ-SC4** would reduce the magnitude of these potential impacts.
- The project's operation would not cause new violations of any NO_2, SO_2, PM2.5 or CO ambient air quality standards, and therefore, the project direct operational NOx, SOx, PM2.5 and CO emission impacts would not be adverse.
- The project's direct and indirect, or secondary emissions contribution to existing violations of the ozone and PM10 ambient air quality standards are likely to be adverse, unless they are reduced through mitigation. Mitigation measure **AQ-SC7** would mitigate the operating fugitive dust emissions to ensure that the

potentially adverse ozone and PM10 impacts are reduced over the life of the project.

A comparison of the air quality impacts between the proposed project, Mitigated Ivanpah 3 Alternative, Modified I-15 Alternative, and No Action Alternative is presented in **Table 4.1-12**. Overall, the air quality impacts associated with the Mitigated Ivanpah 3 and Modified I-15 Alternatives would be lower than those associated with the proposed project. Overall project air emissions for both alternatives, as compared to the proposed project, would be reduced due to the reduction in the size of the Ivanpah Unit 3 boiler, and the reduced area of ground disturbance associated with project construction. The re-location of the Ivanpah Unit 3 power block would result in a small increase in one-hour NOx emissions detected at the site boundary. However, these increased emissions would not exceed any of the regulatory thresholds, and would be very limited in duration.

Although the emissions for both alternatives would be lower than those for the proposed project, they would still cause direct, adverse impacts to air quality, and would also contribute, along with other proposed projects in the area, to a cumulative adverse impact on air quality. However, the mitigation measures discussed above would ensure that emissions would not exceed any NEPA or permitting criteria.

Table 4.1-12
Comparison of Air Quality Impacts

Potential Impact	Proposed Project	Mitigated Ivanpah 3 Alternative	Modified I-15 Alternative	No Action Alternative
General Conformity Applicability Threshold	Could exceed threshold if not mitigated	Lower than proposed project, higher than No Action. Could exceed threshold if not mitigated.	Lower than proposed project, higher than No Action. Could exceed threshold if not mitigated.	No potential impact
PSD Permit Applicability Threshold	Could exceed threshold if not mitigated	Lower than proposed project, higher than No Action. Could exceed threshold if not mitigated.	Lower than proposed project, higher than No Action. Could exceed threshold if not mitigated.	No potential impact
Exceedance of NAAQS	Could exceed threshold if not mitigated	Lower than proposed project, higher than No Action. Could exceed threshold if not mitigated.	Lower than proposed project, higher than No Action. Could exceed threshold if not mitigated.	No potential impact

4.2 Greenhouse Gas Emissions

Introduction

In this section, GHG emissions associated with the proposed project and alternatives are evaluated. Overall, the impacts are evaluated within the context of:

- GHG emissions caused by project construction and operation;
- GHG sequestration eliminated by project construction and operation; and
- GHG emissions avoided by displacement of fossil-fuel generation.

In this context, this section evaluates the GHG emissions from the proposed project, presents information on GHG emissions related to electricity generation, and describes the applicable GHG standards and requirements.

Resource-Specific Project Description

Project Greenhouse Gas Emissions

Construction of industrial facilities such as power plants requires coordination of numerous equipment and personnel. The concentrated on-site activities result in short-term, unavoidable increases in vehicle and equipment emissions that include greenhouse gases. Construction of the proposed project has three phases, each of which would last about 24 months. There would be a 12 month-overlapping period between each phase, which would result in 4 years of entire construction period. The applicant provided a construction emission estimate that BLM used to calculate greenhouse gas emissions for the entirety of the construction activities. The greenhouse gas emissions estimate, presented below in **Table 4.2-1,** were converted by BLM into metric tons of CO_2 equivalent (MTCO2E) and totaled.

Table 4.2-1
ISEGS Estimated Potential Construction Greenhouse Gas Emissions

Construction Element	CO_2-equivalent (MTCO2E) [a,b]
Off-road Equipment	10,444
Heavy Delivery Trucks	1,925
Construction Worker Transportation	5,410
Construction Total	17,779

Source: BLM estimates using the applicant's criteria pollutant emissions estimates (CH2M Hill 2007)
Notes:
a One metric tonne (MT) equals 1.1 short tons or 2,204.6 pounds or 1,000 kilograms.
b The vast majority of the CO2E emissions, over 99 percent, are CO2 from these combustion sources.

Operations GHG emissions are shown in **Table 4.2-2**. The proposed ISEGS project would cause GHG emissions from the power block maintenance activities, including mirror cleaning and minimal undesired vegetation removal, the weekly testing of the emergency generator and firewater pump, one hour per day of operation of each boiler, and employee trips.

Table 4.2-2 shows what the proposed project, as permitted, could potentially emit in greenhouse gases on an annual basis. All emissions are converted to CO2-equivalent and totaled. Electricity generation GHG emissions are generally dominated by CO2 emissions from the carbon-based fuels; other sources of GHG are typically small and also are more likely to be easily controlled or reused/recycled. For this solar project the primary fuel, solar energy, is greenhouse gas free, but there is a natural gas-fired steam boiler for each of the three plants. Other comparatively large GHG emission sources for this project are the testing of the emergency generator engines, maintenance vehicles, and worker vehicles. Testing of the firewater pump engines, delivery trips and SF6 equipment leakage provide additional minor sources of GHG emissions.

Table 4.2-2
Estimated ISEGS Potential Operating Greenhouse Gas Emissions

	CO2-equivalent (MTCO2E[a] per year)
Boilers	25,458
Emergency Generator Engines	346
Fire Pump Engine	15
Maintenance Vehicles	474
Worker Vehicles	1118
Delivery and Waste Haul Vehicles	22
Equipment Leakage (SF_6)	10
Total Project GHG Emissions – MTCO2E [b]	**27,444**
Facility MWh per year [c]	960,000
Facility GHG Performance (MTCO2E/MWh)	0.029

Sources: CH2M Hill 2007, where BLM updated the natural gas GHG emissions factors to use the latest ARB recommendations (ARB 2008b) and included all operating GHG emission sources in the estimate.
Notes:
a One MT equals 1.1 short tons or 2,204.6 pounds or 1,000 kilograms.
b The vast majority of the CO2E emissions, over 99 percent, are CO2 from these emission sources.
c Approximately a 28 percent capacity factor. CH2M Hill 2007.

The proposed project would be permitted, on an annual basis, to emit over 27,000 metric tonnes of CO2-equivalent per year if operated at its maximum permitted level. ISEGS is a solar project with a nightly shutdown so it will operate less than 60% of capacity; therefore, the project is not subject to the requirements of SB 1368 and the Greenhouse Gas Emission Performance Standard. However, the ISEGS, at 0.029 MTCO2E/MWh, would easily meet the requirements of SB 1368 and the Greenhouse Gas Emission Performance Standard of 0.500 MTCO2/MWh.

Closure and decommissioning, as a one-time limited duration event, would have emissions that are similar in type and magnitude, but likely lower than, the construction emissions as discussed above.

Applicable Laws, Regulations, and Supplemental Authorities

Federal

On April 2, 2007, the United States Supreme Court found that GHGs are pollutants that must be covered by the Federal Clean Air Act (CAA). In response, on September 30, 2009, the United States Environmental Protection Agency (EPA) proposed to apply Prevention of Significant Deterioration (PSD) requirements to faciltieis whose carbon dioxide (CO2)-equivalent emissions exceed 25,000 tons per year. The Council on Environmental Quality (CEQ) published draft guidance on February 18, 2010 for Federal agencies to improve their consideration of the effects of GHG emissions and climate change in their evaluation of proposed for Federal actions under NEPA.

On September 14, 2009, the Secretary of the Interior issued the Secretary's Order Number 3289 to establish a Department-wide approach for applying scientific tools to cinrease understanding of climate change and to coordinate and effective response to its impacts on tribes and on the land, water, ocean, fish and wildlife, and cultural heritage resources that the Department manages. The Order established a Climate Change Response Council to execute a coordinated strategy to address impacts of climate change on natural and cultural resources.

State

The following state laws and policies in **Table 4.2-3** pertain to the control and mitigation of greenhouse gas emissions.

Table 4.2-3
Applicable Laws, Regulations, and Supplemental Authorities

Applicable Law	Description
State	
California Global Warming Solutions Act of 2006, AB 32 (Stats. 2006; Chapter 488; Health and Safety Code sections 38500 et seq.)	This act requires the California Air Resource Board (ARB) to enact standards that will reduce GHG emission to 1990 levels. Electricity production facilities will be regulated by the ARB.
California Code of Regulations, tit. 17, Subchapter 10, Article 2, sections 95100 et. seq.	These ARB regulations implement mandatory GHG emissions reporting as part of the California Global Warming Solutions Act of 2006 (Stats. 2006; Chapter 488; Health and Safety Code sections 38500 et seq.)
Title 20, California Code of Regulations, section 2900 et seq.; CPUC Decision D0701039 in proceeding R0604009	The regulations prohibit utilities from entering into long-term contracts with any base load facility that does not meet a greenhouse gas emission standard of 0.5 metric tonnes carbon dioxide per megawatt-hour (0.5 MTCO2/MWh) or 1,100 pounds carbon dioxide per megawatt-hour (1,100 lbs CO2/MWh).

4.2.1 Affected Environment

Electricity Project Greenhouse Gas Emissions

Electricity use can be as simple as turning on a switch to operate a light or fan. The system to deliver the adequate and reliable electricity supply is complex and variable.

But it operates as an integrated whole to meet demand, such that the dispatch of a new source of generation generally curtails or displaces one or more less efficient or less competitive existing sources. Within the system, generation resources provide electricity, or energy, generating capacity, and ancillary services to stabilize the system and facilitate electricity delivery, or movement, over the grid. *Capacity* is the instantaneous output of a resource, in megawatts. *Energy* is the capacity output over a unit of time, for example an hour or year, generally reported as megawatt-hours or gigawatt-hours (GWh). Ancillary services include regulation, spinning reserve, non-spinning reserve, voltage support, and black start capability. Individual generation resources can be built and operated to provide only one specific service. Alternatively, a resource may be able to provide one or all of these services, depending on its design and constantly changing system needs and operations.

The Federal government is actively pursuing policies to reduce GHG emissions that include adding non-GHG emitting renewable generation resources to the system mix. The generation of electricity using fossil fuels, even in a back-up generator at a thermal solar plant, produces air emissions known as greenhouse gases in addition to the criteria air pollutants that have been traditionally regulated under the federal and state Clean Air Acts. Greenhouse gas emissions contribute to the warming of the earth's atmosphere, leading to climate change.

For fossil fuel-fired power plants and equipment, these include primarily carbon dioxide, with much smaller amounts of nitrous oxide (N2O, not NO or NO_2, which are commonly known as NOx or oxides of nitrogen), and methane (CH4 – often from unburned natural gas). Also included are sulfur hexafluoride (SF6) from high voltage equipment, and hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) from refrigeration/chiller equipment. GHG emissions from the electricity sector are dominated by CO_2 emissions from the carbon-based fuels; other sources of GHG emissions are small and also are more likely to be easily controlled or reused/recycled, but are nevertheless documented here as some of the compounds have very large relative global warming potentials. Global warming potential is a relative measure, compared to carbon dioxide, of a compound's residence time in the atmosphere and ability to warm the planet. Mass emissions of GHG are converted into carbon dioxide equivalent metric tonnes (MTCO2E) for ease of comparison.

4.2.2 Environmental Consequences

<u>**Methodology**</u>

In their draft guidance, CEQ proposes that agencies should consider the direct and indirect GHG emissions from the action in scoping and in the environmental document. In assessing direct emissions, the agency, an agency should look at the consequences of actions over which it has control or authority. If the emissions exceed an applicable threshold for quantification or reporting, the agerncy should also consider mitigation measures to reduce proposed action-related emissions.

In this section, BLM assesses the amount and impacts of GHG emissions from construction, operation, and closure/decommissioning of the proposed project and it alternatives. As the name implies, construction impacts result from the emissions

occurring during the construction of the project. The operation impacts result from the emissions of the proposed project during operation. The impact of GHG emissions caused by this solar facility is characterized by considering how the power plant would affect the overall electricity system. The integrated electricity system depends on both non-fossil and fossil-fueled generation resources to provide energy and satisfy local capacity needs.

4.2.2.1 Proposed Project

Construction Impacts

The small GHG emission increases from construction activities would not result in direct impacts for several reasons. First, the period of construction will be short-term and the emissions intermittent during that period, not ongoing during the life of the project. Additionally, best practices control measures included within the mitigation measrues, such as limiting idling times and requiring, as appropriate, equipment that meets the latest emissions standards, would further minimize greenhouse gas emissions since the use of newer equipment would increase efficiency and reduce GHG emissions and be compatible with low-carbon fuel (e.g., bio-diesel and ethanol) mandates that will likely be part of the ARB regulations to reduce GHG from construction vehicles and equipment.

Operations Impacts

The proposed ISEGS promotes the state's efforts to move towards a high-renewable, low-GHG electricity system, and, therefore, reduce the amount of natural gas used by electricity generation and greenhouse gas emissions. As the *2007 Integrated Energy Policy* Report (CEC 2007c, p. 184) noted:

> New natural gas-fueled electricity generation technologies offer efficiency, environmental, and other benefits to California, specifically by reducing the amount of natural gas used—and with less natural gas burned, fewer greenhouse gas emissions. Older combustion and steam turbines use outdated technology that makes them less fuel- and cost-efficient than newer, cleaner plants.... The 2003 and 2005 IEPRs noted that the state could help reduce natural gas consumption for electric generation by taking steps to retire older, less efficient natural gas power plants and replace or repower them with new, more efficient power plants.

Thus, in the context of the Energy Commission's *Integrated Energy Policy Report*, the ISEGS - solar-powered, limited GHG emissions and likely replacement of older existing plant capacity, furthers the state's strategy to promote generation system efficiency and reduce fossil fuel use and GHG emissions. As stated in the 2009 *Framework for Evaluating Greenhouse Gas Implications of Natural Gas-Fired Power Plants in California* (CEC 2009d, p.20):

> When one resource is added to the system, all else being held equal, another resource will generate less power. If the new resource has a lower cost or fewer emissions than the existing resource mix, the aggregate system

characteristics will change to reflect the cheaper power and lower GHG emissions rate.

Net GHG emissions for the integrated electric system will decline when new renewable power plants are added to: 1) move renewable generation towards the 33 percent target; 2) improve the overall efficiency, or GHG emission rate, of the electric system; or 3) serve load growth or capacity needs more efficiently, or with fewer GHG emissions.

The Role of ISEGS in Renewables Goals/Load Growth

As the nation moves towards an increased reliance on renewable energy, non-renewable energy resources may be curtailed or displaced. This potential reduction in non-renewable energy within California, shown in **Table 4.2-4**, could be as much as 36,000 GWh. These assumptions are conservative in that the forecasted growth in retail sales assumes that the impacts of planned increases in expenditures on (uncommitted) energy efficiency are already embodied in the current retail sales forecast[6]. If, for example, forecasted retail sales in 2020 were lowered by 10,000 GWh due to the success of increased energy efficiency expenditures, non-renewable energy needs fall by an additional 6,700 to 8,000 GWh/year, depending on the RPS level, totaling as much as 45,000 GWh per year of reduced non-renewable energy, depending on the RPS assumed.

Table 4.2-4
Estimated Changes in Non-Renewable Energy Potentially Needed to Meet California Loads, 2008-2020

California Electricity Supply	Annual GWh	
Statewide Retail Sales, 2008, estimated [a]	265,185	
Statewide Retail Sales, 2020, forecast [a]	308,070	
Growth in Retail Sales, 2008-20	42,885	
Growth in Net Energy for Load [b]	46,316	
California Renewable Electricity	**GWh @ 20% RPS**	**GWh @ 33% RPS**
Renewable Energy Requirements, 2020 [c]	61,614	101,663
Current Renewable Energy, 2008	29,174	
Change in Renewable Energy-2008 to 2020 [c]	32,440	72,489
Resulting Change in Non-Renewable Energy [d]	13,876	(-36,173)

Source: Energy Commission staff 2009.
Notes:
a. Not including 8 percent transmission and distribution losses.
b. Based on 8 percent transmission and distribution losses, or 42,885 GWh x 1.08 = 46,316 GWh.
c. Renewable standards are calculated on retail sales and not on total generation, which accounts for 8 percent transmission and distribution losses.
d. Based on net energy (including 8 percent transmission and distribution losses), not based on retail sales

[6] The extent to which uncommitted energy efficiency savings are already represented in the current Energy Commission demand forecast is a subject of study for the 2009 IEPR.

The Role of ISEGS in Retirements/Replacements

ISEGS would be capable of annually providing 960 GWh of renewable generation to replace resources that are or will likely be precluded from serving California loads. State policies, including GHG goals, are discouraging or prohibiting new contracts and new investments in high GHG-emitting, such as coal-fired, generation, generation that relies on water for once-through cooling, and aging power plants (CEC 2007c). Therefore, some of the existing plants that are likely to require substantial capital investments to continue operation in light of these policies may be unlikely to undertake the investments and will retire or be replaced.

Replacement of High GHG-Emitting Generation

High GHG -emitting resources, such as coal, are effectively prohibited from entering into new contracts for California electricity deliveries as a result of the Emissions Performance Standard adopted in 2007 pursuant to SB 1368. Between now and 2020, more than 18,000 GWh of energy procured by California utilities under these contracts will have to reduce GHG emissions or be replaced; these contracts are presented in **Table 4.2-5**.

Table 4.2-5
Expiring Long-term Contracts with Coal-fired Generation 2009 – 2020

Utility	Facility [a]	Contract Expiration	Annual GWh Delivered to CA
PG&E, SCE	Misc In-state Qual. Facilities [a]	2009-2019	4,086
LADWP	Intermountain	2009-2013	3,163 [b]
City of Riverside	Bonanza, Hunter	2010	385
Department of Water Resources	Reid Gardner	2013 [c]	1,211
SDG&E	Boardman	2013	555
SCE	Four Corners	2016	4,920
Turlock Irrigation District	Boardman	2018	370
LADWP	Navajo	2019	3,832
		TOTAL	**18,522**

Source: Energy Commission staff based on Quarterly Fuel and Energy Report (QFER) filings.
Notes:
a. All facilities are located out-of-state except for the Miscellaneous In-state Qualifying Facilities.
b. Estimated annual reduction in energy provided to LADWP by Utah utilities from their entitlement by 2013.
c. Contract not subject to Emission Performance Standard, but the Department of Water Resources has stated its intention not to renew or extend.

This represents almost half of the energy associated with California utility contracts with coal-fired resources that will expire by 2030. If the State enacts a carbon adder[7], all the coal contracts (including those in **Table 4.2-5**, which expire by 2020 and, other contracts that expire beyond 2020 and are not shown in the table) may be retired at an

[7] A carbon adder or carbon tax is a specific value added to the cost of a project for per ton of associated carbon or carbon dioxide emissions. Because it is based on, but not limited to, actual operations and emission and can be trued up at year end, it is considered a simple mechanism to assign environmental costs to a project.

accelerated rate as coal-fired energy becomes uncompetitive due to the carbon adder or the capital needed to capture and sequester the carbon emissions. Also shown are the approximate 500 MW of in-state coal and petroleum coke-fired capacity that may be unlikely to contract with California utilities for baseload energy due to SB1368 Emission Performance Standard. As these contracts expire, new and existing generation resources will replace the lost energy and capacity. Some will come from renewable generation; some will come from new and existing natural gas fired generation. All will emit substantially less GHG than the coal and petroleum coke-fired generation, which average about 1.0 MTCO2/MWh without carbon capture and sequestration, resulting in a net reduction in GHG emissions from the California electricity sector.

Retirement of Generation Using Once-Through Cooling

The State Water Resource Control Board (SWRCB) has proposed substantial changes to once-through cooling (OTC) units, shown in **Table 4.2-6**, which would likely require retrofit, retirement, or substantial curtailment of dozens of generating units. In 2008, these units collectively produced about 58,000 GWh. While those OTC facilities owned and operated by utilities and recently-built combined cycles may well install dry or wet cooling towers, it is unlikely that the aging, merchant plants will do so. Most of these units operate at low capacity factors, suggesting a limited ability to compete in the current electricity market. Although the timing would be uncertain, new resources would out-compete aging plants and would displace the energy provided by OTC facilities and likely accelerate the retirements.

Any additional costs associated with complying with the SWRCB regulation would be amortized over a limited revenue stream today and into the foreseeable future. Their energy and much of their dispatchable, load-following capability will have to be replaced. These units constitute over 15,000 MW of merchant capacity and 17,800 GWh of merchant energy. Of this, much but not all of the capacity and energy are in local reliability areas, requiring a large share of replacement capacity – absent transmission upgrades – to locations in the same local reliability area. **Table 4.2-6** provides a summary of the utility and merchant energy supplies affected by the OTC regulations.

New generation resources that can either provide local support or energy will emit substantially less GHGs. Existing aging and OTC natural gas generation average 0.6 to 0.7 MTCO2/MWh, which is much higher than a renewable project like ISEGS. When a project can provide energy and capacity, given its location, it can provide a net reduction in GHG emissions from the California electricity sector. A project like ISEGS located far from the coastal load pockets like the Greater Los Angeles Local Capacity Area, would more likely provide energy support to facilitate the retirement of some aging and/or OTC power plants, but would not likely provide any local capacity support at or near the coastal OTC units.

Table 4.2-6
Units Utilizing Once-Through Cooling: Capacity and 2008 Energy Output [a]

Plant, Unit Name	Owner	Local Reliability Area	Aging Plant?	Capacity (MW)	2008 Energy Output GWh)	GHG Performance (MTCO2/MWh)
Diablo Canyon 1, 2	Utility	None	No	2,232	17,091	Nuclear
San Onofre 2, 3	Utility	L.A. Basin	No	2,246	15,392	Nuclear
Broadway 3 [b]	Utility	L.A. Basin	Yes	75	90	0.648
El Centro 3, 4 [b]	Utility	None	Yes	132	238	0.814
Grayson 3-5 [b]	Utility	LADWP	Yes	108	150	0.799
Grayson CC [b]	Utility	LADWP	Yes	130	27	0.896
Harbor CC	Utility	LADWP	No	227	203	0.509
Haynes 1, 2, 5, 6	Utility	LADWP	Yes	1,046	1,529	0.578
Haynes CC [c]	Utility	LADWP	No	560	3,423	0.376
Humboldt Bay 1, 2 [a]	Utility	Humboldt	Yes	107	507	0.683
Olive 1, 2 [b]	Utility	LADWP	Yes	110	11	1.008
Scattergood 1-3	Utility	LADWP	Yes	803	1,327	0.618
Utility-Owned				**7,776**	**39,988**	**0.693**
Alamitos 1-6	Merchant	L.A. Basin	Yes	1,970	2,533	0.661
Contra Costa 6, 7	Merchant	S.F. Bay	Yes	680	160	0.615
Coolwater 1-4 [b]	Merchant	None	Yes	727	576	0.633
El Segundo 3, 4	Merchant	L.A. Basin	Yes	670	508	0.576
Encina 1-5	Merchant	San Diego	Yes	951	997	0.674
Etiwanda 3, 4 [b]	Merchant	L.A. Basin	Yes	666	848	0.631
Huntington Beach 1, 2	Merchant	L.A. Basin	Yes	430	916	0.591
Huntington Beach 3, 4	Merchant	L.A. Basin	No	450	620	0.563
Mandalay 1, 2	Merchant	Ventura	Yes	436	597	0.528
Morro Bay 3, 4	Merchant	None	Yes	600	83	0.524
Moss Landing 6, 7	Merchant	None	Yes	1,404	1,375	0.661
Moss Landing 1, 2	Merchant	None	No	1,080	5,791	0.378
Ormond Beach 1, 2	Merchant	Ventura	Yes	1,612	783	0.573
Pittsburg 5-7	Merchant	S.F. Bay	Yes	1,332	180	0.673
Potrero 3	Merchant	S.F. Bay	Yes	207	530	0.587
Redondo Beach 5-8	Merchant	L.A. Basin	Yes	1,343	317	0.810
South Bay 1-4	Merchant	San Diego	Yes	696	1,015	0.611
Merchant-Owned				**15,254**	**17,828**	**0.605**
Total In-State OTC				**23,030**	**57,817**	

Source: Energy Commission staff based on QFER filings.
Notes:
a. OTC Humboldt Bay Units 1 and 2 are included in this list. They must retire in 2010 when the new Humboldt Bay Generating Station (not ocean-cooled), currently under construction, enters commercial operation.
b. Units are aging but are not OTC.

Solar Energy Payback Time

The beneficial energy and greenhouse gas impacts of renewable energy projects can also be measured by the *energy payback time.*[8] **Tables 4.2-1** and **4.2-2** provide an estimate of the onsite construction and operation emissions, employee transportation emissions, and the final segment of offsite materials and consumables transportation. However, there are additional direct transportation and indirect manufacturing GHG emissions associated with the construction and operation of the proposed project, which are all considered in the determination of the energy payback time. A document sponsored by Greenpeace estimates that the energy payback time for concentrating solar power plants, such as ISEGS, to be on the order of 5 months (Greenpeace 2005, Page 9); and the project life for ISEGS is on the order of 50 years. Therefore, the proposed project's GHG emissions reduction potential from energy displacement would be substantial.[9]

Natural Carbon Uptake Reduction

This proposed project would cause the clearing of land and removal of vegetation, which would reduce the ongoing natural carbon uptake by vegetation. A study of the Mojave Desert indicated that the desert may uptake carbon in amounts as high as 100 grams per square meter per year (Wohlfahrt et al. 2008). This would equate to a maximum reduction in carbon uptake, calculated as CO_2, of 1.48 MT of CO_2 per acre per year for areas with complete vegetation removal. For this 4,073-acre proposed project, which does not actually require the complete removal of vegetation over most of the project site, the maximum equivalent loss in carbon uptake would be 6,028 MT of CO_2 per year, which would correspond to 0.007 MT of CO_2 per MW generated. Therefore, the natural carbon uptake loss is negligible in comparison with the reduction in fossil fuel CO_2 emissions, which can range from 0.35 to 1.0 MT of CO_2 per MW depending on the fuel and technology, that is enabled by this proposed project.

<u>Closure and Decommissioning Impacts</u>

Eventually the facility will close, either at the end of its useful life or due to some unexpected situation such as a natural disaster or catastrophic facility breakdown. When the facility closes, all sources of air emissions would cease to operate and thus impacts associated with those greenhouse gas emissions would no longer occur. The only other expected, albeit temporary, GHG emissions would be equipment exhaust (off-road and on-road) from the dismantling activities. These activities would be of much a shorter duration than construction of the project, equipment are assumed to have

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[8] The energy payback time is the time required to produce an amount of energy as great as what was consumed during production, which in the context of a solar power plant includes all of the energy required during construction and operation.

[9] The GHG displacement for the project would be similar to, but not exactly the same as, the amount of energy produced after energy payback is achieved multiplied by the average GHG emissions per unit of energy displaced. The average GHG emissions for the displaced energy over the project life is not known but currently fossil fuel fired power plants have GHG emissions that range from 0.35 MT/MWh CO2E for the most efficient combined cycle gas turbine power plants to over 1.0 MT/MWh for coal fired power plants.

lower comparative GHG emissions due to technology advancement, and would be required to be controlled in a manner at least equivalent to that required during construction. It is assumed that the beneficial GHG impacts of this facility, displacement of fossil fuel fired generation, would be replaced by the construction of newer more efficiency renewable energy or other low GHG generating technology facilities. Also, the recycling of the facility components (steel, concrete, etc.) could indirectly reduce GHG emissions. Therefore, during decommissioning there would be a temporary adverse greenhouse gas impact.

Beneficial Impacts

Greenhouse gas related noteworthy public benefits include the construction of renewable and low-GHG emitting generation technologies and the potential for successful integration into the California and greater WECC electricity systems.

4.2.2.2 Mitigated Ivanpah 3 Alternative

Construction Impacts

The construction-related GHG emissions sources associated with the Mitigated Ivanpah 3 Alternative would be the same as those described for the proposed project, including emissions from vehicles and heavy equipment. Overall, these GHG emissions would be lower than those associated with the proposed project, due to the reduced number of heliostats and power towers, and the reduced duration of construction. Construction-related GHG emissions from the proposed project would likely result in minimal adverse impacts; however, since emissions associated with this alternative would be even lower, there would not be expected to be any adverse impacts from GHG emissions.

Operations Impacts

The features of the Mitigated Ivanpah 3 alternative that would involve GHG emissions from operations that are different than those of the proposed project are:

- Reduction in annual fuel usage in the auxiliary boilers resulting primarily from the 50% reduction in the capacity for the Ivanpah 3 auxiliary boiler,
- Reduction in the acreage of vegetation (natural carbon uptake) that would be disturbed;
- Elimination of one of the emergency generators for Ivanpah 3, and
- Elimination of approximately 40,000 heliostats (from 213,500 to 173,500) which reduce the vehicle miles travelled (VMT) for maintenance (i.e., mirror washing) and the associated tailpipe GHG emissions.

Updated GHG emissions from operations for the Mitigated Ivanpah 3 Alternative are shown in **Table 4.2-7**. Based on this estimate of GHG emissions, the Mitigated Ivanpah 3 Alternative, including stationary sources and onsite and offsite mobile sources, would be permitted, on an annual basis, to emit approximately 20,900 MTCO2E per year if operated at its maximum permitted level.

Like the proposed project, the Mitigated Ivanpah 3 Alternative would disturb natural vegetation that acts to uptake carbon dioxide. Because the footprint of the Mitigated Ivanpah 3 Alternative would be reduced by approximately 9 percent, the disturbance of natural vegetation would be reduced by the same amount. For the 3,564 acre footprint of the Mitigated Ivanpah 3 Alternative, the maximum equivalent loss in carbon uptake would be 5,316 MT of CO_2 per year, which would correspond to 0.006 MT of CO_2 per MW generated. Like the proposed project, the natural carbon uptake loss is negligible in comparison with the reduction in fossil fuel CO_2 emissions.

Table 4.2-7
Updated GHG Emissions for Ivanpah SEGS Based on Mitigated Ivanpah 3 and Modified I-15 Alternative Project Scope

Source Category	Assumed Prorata Metric	Proposed Project	Mitigated Ivanpah 3 and Modified I-15 Alternatives	Prorata Factor	GHG Emissions for Proposed Project[2] (MTCO2E/yr)	GHG Emissions for Alternatives (MTCO2E/yr)
Boilers	Annual Fuel Use Limited to 5% of Solar Input (MMBtu/yr)	480,000	444,000[3]	0.925	25,458	23549
Emergency Generators	Number of Emergency Generators	4	3[1]	0.75	346	260
Diesel Engine Fire Pumps	No Change	N/A	N/A	1.00	15	15
Maintenance Vehicles	Number of Heliostats	213,500	173,500[1]	0.81	474	385
Worker Vehicles	No Change	N/A	N/A	1.00	1,118	1,118
Delivery Vehicles and Waste Haul Vehicles	No Change	N/A	N/A	1.00	22	22
Equipment Leakage (SF6)	No Change	N/A	N/A	1.00	10	10
				TOTAL	27,443	25,359
			Facility MWh per year		960,000	888,000[3]
		GHG Performance (MTCO2E/MWh)			0.029	0.029

1) Source: BSE 2010.
2) Source: CEC 2009a
3) Based on revised facility capacity of 370MW vs. 400MW for original project (BSE 2010a)

Closure and Decommissioning Impacts

The closure-related GHG emissions sources associated with the Mitigated Ivanpah 3 Alternative would be the same as those described for the proposed project, including emissions from vehicles and heavy equipment. Overall, these GHG emissions would

be lower than those associated with the proposed project, due to the reduced number of heliostats and power towers, and the reduced duration of decommissioning. Closure-related GHG emissions from the proposed project would result in minimal adverse impacts; however, since emissions associated with this alternative would be even lower, no adverse impacts would be anticipated from GHG emissions.

Beneficial Impacts

The beneficial impacts associated with the Mitigated Ivanpah 3 Alternative would be the same as those for the proposed project, including the displacement of GHG emissions from fossil fuel-generated power. Because the power output from the Mitigated Ivanpah 3 Alternative would be 370 MW, lower than the 400 MW associated with the proposed project, the beneficial impact would be lower.

4.2.2.3 Modified I-15 Alternative

Construction Impacts

The construction-related GHG emissions sources associated with the Modified I-15 Alternative would be the same as those described for the proposed project, including emissions from vehicles and heavy equipment. Overall, these GHG emissions would be lower than those associated with the proposed project, due to the reduced number of heliostats and power towers, and the reduced duration of construction. Construction-related GHG emissions from the proposed project could potentially cause minimal adverse impacts; however, because emissions associated with this alternative would be even lower, no adverse impacts would be expected to occur.

Operations Impacts

The features of the Modified I-15 alternative that would involve GHG emissions from operations that are different than those of the proposed project are:

- Reduction in annual fuel usage in the auxiliary boilers resulting primarily from the 50% reduction in the capacity for the Ivanpah 3 auxiliary boiler,
- Reduction in the acreage of vegetation (natural carbon uptake) that would be disturbed;
- Elimination of one of the emergency generators for Ivanpah 3, and
- Elimination of approximately 40,000 heliostats (from 213,500 to 173,500) which reduce the VMT for maintenance (i.e., mirror washing) and the associated tailpipe GHG emissions.

Updated GHG emissions from operations for the Modified I-15 Alternative would be the same as those for the Mitigated Ivanpah 3 Alternative, and are shown in **Table 4.2-7**. Based on this estimate of GHG emissions, the Modified I-15 Alternative, including stationary sources and onsite and offsite mobile sources, would be permitted, on an annual basis, to emit approximately 20,900 MTCO2E per year if operated at its maximum permitted level.

Like the proposed project, the Modified I-15 Alternative would disturb natural vegetation that acts to uptake carbon dioxide. Because the footprint of the Modified I-15 Alternative would be reduced by approximately 9 percent, the disturbance of natural vegetation would be reduced by the same amount. For the 3,564 acre footprint of the Modified I-15 Alternative, the maximum equivalent loss in carbon uptake would be 5,316 MT of CO_2 per year, which would correspond to 0.006 MT of CO_2 per MW generated. Like the proposed project, the natural carbon uptake loss is negligible in comparison with the reduction in fossil fuel CO_2 emissions.

Closure and Decommissioning Impacts

The closure-related GHG emissions sources associated with the Modified I-15 Alternative would be the same as those described for the proposed project, including emissions from vehicles and heavy equipment. Overall, these GHG emissions would be lower than those associated with the proposed project, due to the reduced number of heliostats and power towers, and the reduced duration of decommissioning. Closure-related GHG emissions from the proposed project could potentially cause minimal adverse impacts; however, because emissions associated with this alternative would be even lower, no adverse impacts would be expected to occur.

Beneficial Impacts

The beneficial impacts associated with the Modified I-15 Alternative would be the same as those for the proposed project, including the displacement of GHG emissions from fossil fuel-generated power. Because the power output from the Modified I-15 Alternative would be 370 MW, lower than the 400 MW associated with the proposed project, the beneficial impact would be lower.

4.2.2.4 No Action Alternative

In the No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, and could include consideration of another solar project.
- The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If this project is not approved, renewable projects would likely be developed on other sites in the Mojave Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates.

4.2.3 Applicable Laws, Regulations, and Supplemental Authorities

ISEGS, as a solar energy generation project, is exempt from the mandatory GHG emission reporting requirements for electricity generating facilities as currently required by the California ARB for compliance with the California Global Warming Solutions Act of 2006 (AB 32 Núñez, Statutes of 2006, Chapter 488, Health and Safety Code sections 38500 et seq.) (ARB 2008b).

Since this power project would be permitted for less than a 60% annual capacity factor, the project is not subject to the requirements of SB 1368 and the Emission Performance Standard.

4.2.4 Mitigation Measures

No mitigation measures related to Greenhouse Gas emissions are proposed. The project owner would comply with any future applicable GHG regulations formulated by the ARB, such as GHG reporting or emissions cap and trade markets.

4.2.5 Summary

The Ivanpah Solar Electric Generating System project would emit considerably less GHG than existing power plants and most other generation technologies, and thus would contribute to continued improvement of the overall western United States, and specifically California, electricity system GHG emission rate average. The project would lead to a net reduction in GHG emissions across the electricity system that provides energy and capacity to California. Thus, the proposed project would result in a cumulative overall reduction in GHG emissions from the state's power plants, would not worsen current conditions, and would thus not result in adverse impacts.

GHG emissions from construction activities would not be adverse for several reasons. First, the period of construction would be short-term and not ongoing during the life of the project. Additionally, the best practices control measures included in the mitigation measures, such as limiting idling times and requiring, as appropriate, equipment that meets the latest emissions standards, would further minimize greenhouse gas emissions since the use of newer equipment will increase efficiency and reduce GHG emissions and be compatible with low-carbon fuel (e.g., bio-diesel and ethanol) mandates that will likely be part of the ARB regulations to reduce GHG from construction vehicles and equipment. For all these reasons, the short-term emission of greenhouse gases during construction would be sufficiently reduced and would, therefore, not be adverse.

The Ivanpah Solar Electric Generating System project, as a solar project with a nightly shutdown, will operate less than 60% of capacity and is therefore not subject to the requirements of SB 1368 and the Greenhouse Gas Emission Performance Standard. However, the Ivanpah Solar Electric Generating System project would easily meet the requirements of SB 1368 and the Greenhouse Gas Emission Performance Standard.

A comparison of the greenhouse gas emission impacts between the proposed project, Mitigated Ivanpah 3 Alternative, Modified I-15 Alternative, and No Action Alternative is presented in **Table 4.2-8**. Overall, the emission of greenhouse gases associated with

the Mitigated Ivanpah 3 and Modified I-15 Alternatives would be lower than those associated with the proposed project, due to the reduction in the size of the Ivanpah Unit 3 boiler, elimination of an emergency generator, and reduced construction duration associated with the alternatives. However, the Mitigated Ivanpah 3 and Modified I-15 Alternatives would also produce less power output, 370 MW versus 400 MW for the proposed project. As a result, the alternatives would not achieve the same level of beneficial impact of the proposed project in displacing emissions associated with fossil fuel-generating plants.

Table 4.2-8
Comparison of Greenhouse Gas Emission Impacts

Potential Impact	Proposed Project	Mitigated Ivanpah 3 Alternative	Modified I-15 Alternative	No Action Alternative
Project-related GHG emissions	27,443 MTCO2E/yr	25,359 MTCO2E/yr	25,359 MTCO2E/yr	No emissions
Beneficial displacement of fossil fuel-generation emissions	Potential displacement of up to 400 MW of capacity	Potential displacement of up to 370 MW of capacity	Potential displacement of up to 370 MW of capacity	No beneficial displacement of emissions
Disturbance of natural GHG uptake	Maximum equivalent loss in carbon uptake of 6,028 MT	Maximum equivalent loss in carbon uptake of 5,316 MT	Maximum equivalent loss in carbon uptake of 5,316 MT	No loss of uptake

4.3 Biological Resources

Introduction

The potentially-impacted species which are evaluated in this section include wildlife, species afforded protection under the Migratory Bird Treaty Act (MBTA), and special status species. For the purposes of this discussion, special status species include the following: federally listed, proposed, and federal candidate species (USFWS No Date); state-listed species (State of California 2004); and BLM sensitive species (BLM 2004). In addition to special status species, there are numerous species of concern which are evaluated, including Birds of Conservation Concern (BCC) and plant species identified as rare by the CNPS.

Resource Specific Project Description

This subsection describes the specific components of the proposed project and alternatives which were designed to address potential impacts to biological resources, or which could result in impacts to those resources.

The applicant has proposed a LID approach which would attempt to minimize the amount of vegetation removal, soil disturbance, and modification of drainage pathways to the extent practical. Clearing and grubbing, where shrubs and roots are removed, would be performed for permanent access roads in each of the three ISEGS units, in the power blocks, and in common areas where the existing topography requires modification to provide access for installation equipment and materials during construction (CH2M Hill 2009a).

Outside of access roads and maintenance tracks, vegetation would be cut to 12-18 inches to provide clearance for heliostat function, but would leave the root structures intact (CH2M Hill 2009b). The vegetation would be cut with a flail type mower mounted on a low-ground pressure tractor. Vegetation would be maintained at 12-18 inches in the vicinity of heliostats for the duration of the project. The applicant has not provided acreage estimates of what areas would be subject to this vegetation clearing during project construction and operation, but estimated that 412,600 cubic yards of vegetation would be cut and mulched (CH2M Hill 2007, CH2M Hill 2009a).

Potential impacts to vegetation would also be addressed through implementation of a special-status plant mitigation plan, which is currently being developed. In this plan, the applicant proposes on-site minimization of impacts to the Rusby's desert-mallow (a BLM sensitive species) and Mojave milkweed (a CNPS rare species), by protecting a small perimeter or "halo" around the plants during construction and minimizing impacts during operation. Finally, as a component of the Closure, Revegetation, and Rehabilitation Plan, the applicant would be salvaging and transplanting succulents and rare plants which cannot be otherwise avoided.

The proposed project would include fencing of the entire 4,073 acre project site, including tortoise fencing to exclude tortoises from entering the project site. This fencing of the project area would eliminate the area as habitat for many wildlife species.

Potential impacts associated with this removal of habitat are discussed in the sections below.

Applicable Laws, Regulations, and Supplemental Authorities

The proposed project must comply with state and federal laws and regulations that address state and federally listed species, as well as other sensitive species and their habitats.

Federal

The ISEGS project is located on federal land under BLM's jurisdiction and is therefore subject to the provisions of BLM's CDCA Plan (Revised 1999). As an amendment to the CDCA Plan, BLM produced the NEMO Coordinated Management Plan (BLM 2002). This document consists of proposed management actions and alternatives for public lands in the NEMO Planning Area. The ISEGS project is located in the southeastern portion of the NEMO Planning Area Boundary.

The BLM has worked with the USFWS to develop a variety of land designations as tools to protect sensitive biological resources, including the desert tortoise. The siting of the ISEGS project considered the management direction of these designations, as described below:

- **Desert Wildlife Management Areas** are general areas recommended by the Desert Tortoise Recovery Plan (USFWS 1994) within which recovery efforts for the desert tortoise would be concentrated. DWMAs had no specific legal boundaries in the 1994 Recovery Plan. The BLM formalized the general DWMAs from the 1994 Recovery Plan through its planning process and administers them as Areas of Critical Environmental Concern (see below). The ISEGS project does not fall within any DWMA.
- **Area of Critical Environmental Concern** (ACEC) are specific, legally defined, BLM designations where special management is needed to protect and prevent irreparable damage to important historical, cultural, scenic values, fish and wildlife, and natural resources or to protect life and safety from natural hazards. The ISEGS project is not included within any designated ACEC.
- **Critical Habitat** consists of specific areas defined by the USFWS as areas essential for the conservation of the listed species, which support physical and biological features essential for survival and that may require special management considerations or protection. Critical habitat for the desert tortoise was designated in 1994, largely based on proposed DWMAs in the draft Recovery Plan. The ISEGS project is approximately 5 miles from the nearest desert tortoise critical habitat.

BLM provides management direction for species such as desert tortoise within the NEMO, which include five geographical areas of tortoise habitat in the planning area. These areas include an Ivanpah Valley and a North Ivanpah Valley area (BLM 2002), with the ISEGS project located within the Ivanpah Valley habitat area. Current designations for both Ivanpah areas are as Category III desert tortoise habitat (BLM

2002). Category III management goals are to limit tortoise habitat and population declines to the extent possible by mitigating impacts.

Potential take of the desert tortoise, listed as threatened by the USFWS, requires compliance with the federal ESA (16 USC §§ 1531 et seq.). "Take" of a federally-listed species is prohibited without an Incidental Take Statement, which would be obtained through a Section 7 consultation between BLM and the USFWS. The applicant submitted a Draft Biological Assessment for the ISEGS Project (CH2M Hill 2008b) in September 2008. The Final BA was submitted to USFWS on November 30, 2009, and BA amendments were submitted to USFWS on May 26, 2010 and July 21, 2010. The final Biological Opinion (BO) is expected September 9, 2010.

State

The Energy Commission has a one-stop permitting process for all thermal power plants rated 50 MW or more under the Warren-Alquist Act (Pub. Resources Code § 25500). Under the act, the Energy Commission's certificate is "in lieu of" other state, local, and regional permits (*ibid.*) The Commission's streamlined permitting process accomplishes a primary objective of the Renewable Energy Action Team, as identified in the Governor's Executive Order S-14-08 — to create a "one stop" process for permitting renewable energy generation facilities under California law. The Energy Commission has incorporated all required terms and conditions that might otherwise be included in state permits into the Energy Commission's certification process. When Conditions of Certification are finalized they would satisfy the following state regulations and take the place of terms and conditions that, but for the Commission's exclusive authority, would have been included in the following state permits:

- **Incidental Take Permit: California Endangered Species Act (Fish and Game Code §§ 2050 et seq.)** The CESA prohibits the "take" (defined as "to hunt, pursue, catch, capture, or kill") of state-listed species except as otherwise provided in state law. Construction and operation of the ISEGS project could result in the take of desert tortoise, listed as threatened under CESA. Condition of Certification **BIO-17** specifies compensatory mitigation for desert tortoise habitat loss at a 3:1 ratio, with BLM nesting their 1:1 mitigation requirement within this framework. Energy Commission staff have concluded that this funding and mitigation approach would likely be sufficient to provide full mitigation for desert tortoise, pending resolution of the issues discussed earlier in this section. However, CDFG has not yet provided concurrence that this proposed approach and level of mitigation funding would be adequate to fulfill their full mitigation standard.
- **Streambed Alteration Agreement: California Fish and Game Code §§ 1600 1607**. Pursuant to these sections, CDFG typically regulates all changes to the natural flow, bed, or bank, of any river, stream, or lake that supports fish or wildlife resources. Construction and operation of the ISEGS would result in direct or indirect impacts to up to 198 acres of waters of the state. The Energy Commission staff has reviewed information supplied by the applicant (CH2M Hill 2008h, CH2M Hill 2009a, CH2M Hill 2009k, CH2M Hill 2009l) and has developed their proposed Condition of Certification **BIO-19** to require compensatory

mitigation. CDFG has not reviewed this condition and provided only general guidance during its development. Implementation of this condition would minimize and offset impacts to state waters and would assure compliance with CDFG codes that provide protection to state waters.

4.3.1 Affected Environment

4.3.1.1 Vegetation

4.3.1.1.1 Plant Communities

The ISEGS site is located on and surrounded by undisturbed, natural land, with the exception of the Primm Valley Golf Club and I-15 to the east and a transmission line and associated unpaved roads. Vegetation on the site and in the immediate project area consists of primarily Mojave creosote bush scrub, with Mojave yucca – Nevada ephedra scrub, and Mojave wash scrub also represented. Plant communities at the ISEGS site are characterized by an unusually high diversity and density of native succulents and relatively low levels of noxious weeds. Elevations in the project area range from approximately 3,150 to 2,850 feet above mean sea level (CH2M Hill 2007). The Clark Mountain Range occurs to the north and west of the project area, and the topography slopes gradually down to the east and southeast toward Ivanpah Dry Lake on the alluvial fans and bajada on the Clark Mountains' east and south flanks. Approximately 2,000 ephemeral washes, which form part of the regional bajada, occur throughout the project area. The northernmost phase of the project site is immediately flanked by two hills: a limestone hill to the west and a metamorphic hill to the east.

The dominant plant community on the site, Mojave creosote bush scrub, is common in the Mojave Desert and is comprised of drought-adapted native shrubs. A census of all individuals of California barrel cactus (*Ferocactus cylindraceus* var. *lecontei*) and clustered barrel cactus (*Echinocactus polycephalus* var. *polycephalus*) recorded 2,869 individuals of California barrel cactus and 3,501 individuals of clustered barrel cactus within the project area. Densities were estimated at one to two mature barrel cacti per acre for the site overall (CH2M Hill 2007, p. 5.2-105, CH2M Hill 2008i). Densities of 15 mature barrel cacti per acre are found in some localized areas. This density is unusual because it occurs on a bajada rather than on rocky slopes where high barrel cactus densities are expected (CH2M Hill 2007, p. 5.2-28).

Annual plants are also characteristic of Mojave creosote bush scrub but were notably absent during the applicant's initial field surveys in 2007 due to low rainfall (CH2M Hill 2007, p. 5.2-18). Follow-up field surveys were conducted in 2008 to characterize annual plant cover. In the project area, creosote bush (*Larrea tridentata)* is dominant in Mojave creosote bush scrub, and the following are commonly associated perennial species: burrobush (*Ambrosia dumosa*), clustered barrel cactus, Nevada ephedra (*Ephedra nevadensis)*, California barrel cactus, cheesebush (*Hymenoclea salsola*), and Mojave yucca (*Yucca shidigera*) (CH2M Hill 2007, p. 5.2-9).

Additional plant communities and habitats within the project footprint include disturbed land associated with roads and transmission lines, Mojave wash scrub (contains acacia as described below), and numerous ephemeral washes also that occur on the site

(CH2M Hill 2007, pp. 5.2B-4 and 5.2-27). Additional vegetation types within a one-mile radius of the project footprint include Mojave yucca – Nevada ephedra scrub and limestone pavement plain (CH2M Hill 2007, p. 5.2-79). Plant communities of each of the three sites are described below.

Ivanpah 1

Ivanpah 1, the southernmost site, consists almost entirely of the Larrea-Ambrosia subtype of creosote bush scrub and occurs mainly in a form characterized by a low density and diversity of shrubs and cacti and a very low density of Mojave yucca. Here, the dominant shrubs of the larrea-ambrosia subtype are mainly less than 3 feet in height, with many less than 1 foot in height, and relatively widely spaced. Creosote bush and burrobush are the most common shrubs, with cheesebush, pima ratany (*Krameria erecta*), Nevada ephedra, Mojave Desert California buckwheat (*Eriogonum fasciculatum* ssp. *polifolium*), silver cholla (*Opuntia echinocarpa*), buckhorn cholla (*Opuntia acanthocarpa* var. *coloradensis*), beavertail cactus (*Opuntia basilaris* var. *basilaris*), and pencil cholla (*Opuntia ramosissima*) all present in much lower abundance. Barrel cacti of both species (i.e., California barrel cactus and clustered barrel cactus) and Mojave yucca are present in low to very low numbers. The topography of the Ivanpah 1 site is relatively flat, although it is broken by a number of small to medium-sized ephemeral washes dominated by cheesebush.

Ivanpah 2

Vegetation of Ivanpah 2 consists predominantly of the larrea-ambrosia subtype of Mojave creosote bush scrub. This vegetation subtype varies in shrub and cactus density and species diversity from areas that are moderate in density and diversity at the upper elevation west end to areas that are low in density and diversity at the lower elevation east end. Creosote bush and burrobush are the dominant shrubs and are typically 1 to 4 feet in height. Associated species include: cheesebush, pima ratany, Nevada ephedra, Mojave Desert California buckwheat, silver cholla, buckhorn cholla, beavertail cactus, and pencil cactus. The density of barrel cacti, including California barrel cactus and clustered barrel cactus, and Mojave yucca, is highest in the northern third of the site, moderately high in the western half of the site, and lowest in the southern half, especially to the east.

The topography is relatively flat overall and dissected by many small to medium-sized ephemeral washes with active channels usually less than 5 feet wide that flow from west to east in the northern half of Ivanpah 2 and trend from southwest to northeast and east in the southern half of Ivanpah 2. The vegetation of most of these is composed mainly of shrub species typical of larrea-ambrosia scrub. Cheesebush washes are in higher densities than in adjacent areas. North of Colosseum Road, in the southern half of Ivanpah 2, is a large drainage complex up to 75 feet wide in some areas, although the active channels are much narrower. This large wash system supports Mojave wash scrub, although in a form distinguished mainly by the presence of catclaw acacia (*Acacia greggii*). This form has lower shrub species diversity than the Mojave wash scrub observed in Ivanpah 3.

Ivanpah 3

Ivanpah 3 is the northernmost and largest of the three proposed sites and supports more complex plant communities than Ivanpah I and 2. The larrea-ambrosia scrub subtype of Mojave creosote bush scrub is the most common vegetation type and occurs throughout Ivanpah 3, covering about 75 to 80 percent of the site. The larrea mixed scrub subtype of Mojave creosote bush scrub occurs north and south of the limestone hill, along the southwest margin, and also immediately adjacent to the northern boundary of Ivanpah 3. In the western and northern parts of Ivanpah 3, larrea mixed scrub patches alternate with patches of larrea-ambrosia scrub. Some of the larger drainage features, which are concentrated in the northern and western sections of Ivanpah 3, contain well-developed Mojave wash scrub. Within Ivanpah 3, the larrea-ambrosia scrub subtype varies from the low density-low diversity form to the high density-high diversity form. The patterns are complex but, in general, vegetation with lower densities and diversity of shrubs and cacti, and lower densities of Mojave yucca, is more widespread in the southeastern section of Ivanpah 3.

The elevation gradient within Ivanpah 3 trends very gradually downward from approximately 3,400 feet at the western margin to about 2,985 feet at the southeastern corner. The topography of Ivanpah 3 is more strongly undulating than that of Ivanpah 1 and 2 due to the presence of many small to large ephemeral wash drainage features that trend generally in a west-to-east direction. Mojave wash scrub is well-developed in some of the larger ephemeral wash drainage features in the northern and western sections of Ivanpah 3. These drainage features are typically 30 to 75 feet wide bank-to-bank, although the active channels occupy only a small portion of the entire feature.

Mojave wash scrub within Ivanpah 3 varies in density and diversity of shrubs. The dominant shrubs are drought-deciduous and are typically 3 to 10 feet in height. The best-developed stands include many large individuals of catclaw acacia, some scattered large desert-willow (*Chilopsis linearis*), and a variety of wash-associated smaller shrubs, including: cheesebush, desert almond (*Prunus fasciculata*), black-banded rabbitbrush (*Chrysothamnus paniculatus*), bladder sage (*Salazaria mexicana*), Cooper's boxthorn (*Lycium cooperi*), and Anderson's boxthorn (*Lycium andersonii*).

4.3.1.1.2 California Native Plant Society (CNPS) Species

Table 4.3-1 lists CNPS and special status species that are known to occur or could potentially occur within the region. Many of these species are unlikely to occur at the ISEGS site due to lack of suitable habitat, but some of these species were either detected during the 2007/2008 surveys or are otherwise known to occur at or near the site. Those are indicated by **bold-face type**. Many sensitive species have the potential to occur within the project site and within the region. These species are monitored due to concerns about population viability and as useful indicators of ecosystem health.

Many uncommon plant species were documented in the ISEGS project area, buffer areas, and immediate vicinity during botanical surveys (CH2M Hill 2008i), including eight plant species listed by the CNPS. This FEIS focuses on CNPS rare plant species, which are defined as follows:

List 1A: Plants Presumed Extinct in California

List 1B: Plants Rare, Threatened, or Endangered in California and Elsewhere.

List 2: Plants Rare, Threatened, or Endangered in California, but More Common Elsewhere

Table 4.3-1
Special-Status Species Known or Potentially Occurring in the ISEGS Project Area and Vicinity

PLANTS		
Common Name	***Scientific Name***	**Status State/Fed/CNPS/BLM (see end of table for explanation of codes)**
Mormon needle grass	*Achnatherum aridum*	__/__/2.3/_
Clark Mountain agave*	***Agave utahensis var. nevadensis***	**__/__/4.2/_**
Desert ageratina	*Ageratina herbacea*	__/__/2.3/_
Coyote gilia	*Aliciella triodon*	__/__/2.2/_
Small-flowered androstephium	***Androstephium breviflorum***	**__/__/2.23/_**
White bear poppy	*Arctomecon merriamii*	__/__/2.2/_
Mojave milkweed	***Asclepias nyctaginifolia***	**__/__/2.1/_**
Cima milk-vetch	*Astragalus cimae var. cimae*	__/__/1B.2/S
Providence Mountain milk-vetch	*Astragalus nutans*	__/__/4.2/_
Scaly cloak fern	*Astrolepis cochisensis ssp. cochisensis*	__/__/2.3/_
Black grama	*Bouteloua eriopoda*	__/__/4.2/_
Red grama	*Bouteloua trifida*	__/__/2.3/_
Alkali mariposa lily	*Calochortus striatus*	__/__/1B.2/S
Purple bird's-beak	*Cordylanthus parviflorus*	__/__/2.3/_
Desert pincushion	***Coryphantha chlorantha***	**__/__/2.1/_**
Viviparous foxtail cactus*	***Coryphantha vivipara var. rosea***	**__/__/2.2/_**
Winged cryptantha	*Cryptantha holoptera*	__/__/4.3/_
Gilman's cymopterus	*Cymopterus gilmanii*	__/__/2.3/_
Utah vine milkweed	***Cynanchum utahense***	**__/__/4.2/_**
Nine-awned pappus grass	***Enneapogon desvauxii***	**__/__/2.2/_**
Naked-stemmed daisy	*Enceliopsis nudicaulis ssp. nudicaulis*	__/__/4.3/_
Limestone daisy	*Erigeron uncialis var. uncialis*	__/__/1B.2/S
Forked buckwheat	*Eriogonum bifurcatum*	__/__/1B.2/S
Hairy erioneuron	*Erioneuron pilosum*	__/__/2.3/_
Clark Mountain spurge	*Euphorbia exstipulata var. exstipulata*	__/__/2.1/_
Wright's bedstraw	*Galium wrightii*	__/__/2.3/_
Pungent glossopetalon	*Glossopetalon pungens*	__/__/1B.2/S
Parish club-cholla	***Grusonia parishii***	**__/__/2.2/_**
Hairy-podded fine-leaf hymenopappus	*Hymenopappus filifolius var. eriopodus*	__/__/2.3/_
Jaeger's ivesia	*Ivesia jaegeri*	__/__/1B.3/S

PLANTS		
Common Name	***Scientific Name***	**Status State/Fed/CNPS/BLM (see end of table for explanation of codes)**
Knotted rush	*Juncus nodosus*	__/__/2.3/_
Hillside wheat grass	*Leymus salinus ssp. mojavensis*	__/__/2.3/_
Plains flax	*Linum puberulum*	__/__/2.3/_
Spearleaf	*Matelea parvifolia*	__/__/2.3/_
Rough menodora	*Menodora scabra*	__/__/2.3/_
Polished blazing star	*Mentzelia polita*	__/__/1B.2/S
Utah mortonia*	***Mortonia utahensis***	**__/__/4.3/_**
Tough muhly	*Muhlenbergia arsenei*	__/__/2.3/_
Crowned muilla	*Muilla coronata*	__/__/4.2/_
False buffalo-grass	*Munroa squarrosa*	__/__/2.2/_
Cave evening-primrose*	***Oenothera cavernae***	**__/__/2.1/_**
Short-joint beavertail	*Opuntia basilaris var. brachyclada*	__/__/1B.2/S
Curved-spine beavertail	*Opuntia curvospina*	__/__/2.2/_
Spiny cliff-brake	*Pellaea truncata*	__/__/2.3/_
White-margined beardtongue	*Penstemon albomarginatus*	__/__/1B.2/S
Rosy two-toned beardtongue	*Penstemon bicolor ssp. roseus*	__/__/2.3/_
Limestone beardtongue	*Penstemon calcareous*	__/__/1B.3/S
Death Valley beardtongue	*Penstemon fruticiformis var. amargosae*	__/__/1B.3/S
Stephen's beardtongue	*Penstemon stephensii*	__/__/1B.3/S
Thompson's beardtongue	*Penstemon thompsoniae*	__/__/2.3/_
Utah beardtongue	*Penstemon utahensis*	__/__/2.3/_
Aven Nelson's phacelia	*Phacelia anelsonii*	__/__/2.3/_
Barneby's phacelia	*Phacelia barnebyana*	__/__/2.3/_
Sky-blue phacelia	*Phacelia coerulea*	__/__/2.3/_
Parish's phacelia	*Phacelia parishii*	__/__/1B.1/S
Jaeger's phacelia	*Phacelia perityloides var. jaegeri*	__/__/1B.3/S
Chambers' physaria	*Physaria chambersii*	__/__/2.3/_
Small-flowered rice grass	*Piptatherum micranthum*	__/__/2.3/_
Desert portulaca	***Portulaca halimoides***	**__/__/4.3/_**
Abert's sanvitalia	*Sanvitalia abertii*	__/__/2.2/_
Many-flowered schkuhria	*Schkuhria multiflora var. multiflora*	__/__/2.3/_
Johnson's bee-hive cactus	*Sclerocactus johnsonii*	__/__/2.2/_
Mojave spike-moss	*Selaginella leucobryoides*	__/__/4.3/_
Rusby's desert-mallow	***Sphaeralcea rusbyi var. eremicola***	**__/__/1B.2/S**

WILDLIFE		
Common Name	***Scientific Name***	**Status State/Fed/BLM(see end of table for explanation of codes)**
Reptiles		
Desert tortoise	***Gopherus agassizii***	**ST/FT/__**
Banded gila monster	*Heloderma suspectum cinctum*	__/SC/S
Birds		
Burrowing owl	***Athene cunicularia***	**CSC/FSC/__**
Golden eagle	***Aquila chrysaetos***	**CSC, FP/FSC/S**
Vaux's swift	***Chaetura vauxi***	**__/FSC/__**
Gray-headed junco	*Junco hyemalis caniceps*	WL/FSC/__
Loggerhead shrike	***Lanius ludovicianus***	**CSC/FSC/__**
Hepatic tanager	*Piranga flava*	WL/FSC/__
Summer tanager	*Piranga rubra*	CSC/__/__
Brewer's sparrow	***Spizella breweri***	**__/BCC/__**
Bendire's thrasher	*Toxostoma bendirei*	CSC/BCC/S
Crissal thrasher	***Toxostoma crissale***	**CSC/BCC/__**
Le Conte's thrasher	***Toxostoma lecontei***	**WL/BSS/__**
Virginia's warbler	*Vermivora virginiae*	WL/BCC/__
Gray vireo	*Vireo vicinior*	CSC/BCC/S
Mammals		
Townsend's big-eared bat	*Corynorhinus townsendii*	CSC/__/S
Pallid bat	*Antrozous pallidus*	CSC/__/S
Long-legged myotis	*Myotis volans*	__/__/S
Nelson's bighorn sheep	*Ovis canadensis nelsoni*	__/__/S
American badger	***Taxidea taxus***	**CSC/__**

Bold-face-type species names are those observed on or near the proposed project site or plants observed in the one-mile buffer by the applicant during the 2007/08 field surveys.

* Found in buffer area surveys only. For all but Utah mortonia; no specific location information was included in the applicant's final botanical plant report (CH2M Hill 2008i).

Sources: CNDDB 2009 (Ivanpah Lake, State Line Pass, Mesquite Lake, Clark Mountain, Mescal Range, Mineral Hill, Nipton, and Desert USGS Quads); Plants: CNPS 2009, CDFG 2009; Animals: CDFG Special Animals List;

Status Codes:

Federal: FE - Federally listed endangered: species in danger of extinction throughout a significant portion of its range
FT - Federally listed, threatened: species likely to become endangered within the foreseeable future
BCC: Fish and Wildlife Service: Birds of Conservation Concern: Identifies migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent highest conservation priorities <www.fws.gov/migratorybirds/reports/BCC2002.pdf>

State CSC = California Species of Special Concern Species of concern to CDFG because of declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction.
SE - State listed as endangered
ST = State listed as threatened
WL = State watch list

California Native Plant Society

List 1B - Rare, threatened, or endangered in California and elsewhere
List 2 - Rare, threatened, or endangered in California but more common elsewhere
List 3 - Plants which need more information
List 4 - Limited distribution – a watch list
0.1 - Seriously threatened in California (high degree/immediacy of threat)
0.2 - Fairly threatened in California (moderate degree/immediacy of threat)
0.3 - Not very threatened in California (low degree/immediacy of threats or no current threats known)

BLM: Sensitive: Bureau of Land Management

BLM Manual §6840 defines sensitive species as"…species that require special management consideration to avoid potential future listing under the ESA and that have been identified in accordance with the procedures set forth in this manual". Special status species include those "collectively, federally listed or proposed and Bureau sensitive species, which include both Federal candidate species and delisted species within 5 years of delisting." In California, this manual has been temporarily modified as follows: "Unless specifically excluded by the State Director, all plant species listed by the State of California as rare, threatened, or endangered will be treated as BLM sensitive species." And "Unless specifically excluded by the State Director, all plant species on List 1B (Plants Rare, Threatened, or Endangered in California and Elsewhere) of the California Native Plant Society's Online Inventory of Rare and Endangered Plans of California that are on BLM lands or affected by BLM action and that are not Federally listed or proposed are designated as sensitive in California."

One of these, Rusby's desert-mallow, also is a BLM sensitive species (see Special Status Species – Plants). Information on the natural history, distribution, and status of these species on the project area is provided below. The status information is based on the results of the floristic surveys conducted in 2007/2008 (CH2M Hill 2008i). In addition to the floristic surveys, databases and files of the CDFG's CNDDB, NatureServe (an international network of natural heritage programs), CNPS, and the Consortium of California Herbaria (2008) data, including information not yet entered into the CNDDB and CNPS databases, were examined. Four CNPS rare plants (Clark Mountain agave, viviparous foxtail cactus, Utah mortonia, and cave evening-primrose) located inside the buffer area but outside of the project footprint are not evaluated further since they would not be impacted by the project.

Small-Flowered Androstephium (Androstephium breviflorum)

Small-flowered androstephium is a bulbiferous herb found mainly in San Bernardino County, though it has been recorded in adjacent Riverside County and possibly Inyo County. This species also occurs in Arizona, Nevada, and Utah. It is found in dry, loose sandy to rocky soils and on sand dunes and alluvial fans. The CNDDB Element Occurrence records are all presumed extant. In addition, approximately 31 occurrences were documented in the AFC for the Stirling Energy Systems Solar One Project (SES 2008b). This species was not detected in 2007, but in 2008 a total of 12 individuals

were mapped in four locations on the ISEGS project site, within Ivanpah 1 and 2, in Mojave creosote bush scrub. Many new occurrences of this species have been found in recent years and the project area includes only a very small portion of its total distribution in California.

Mojave Milkweed (Asclepias nyctaginifolia)

The California distribution of Mojave milkweed is limited to a very small area in eastern San Bernardino County. Currently, it is known from less than 25 occurrences, 16 of which occur in Ivanpah Valley in the project area (CNDDB 2009) **(Figure 4.3-1A** and **4.3-1B).** Its distribution outside of Ivanpah Valley is limited to a few very old historic collections and only two other populations that have been confirmed extant (CNDDB 2009). This perennial plant also occurs in Arizona, New Mexico, and Nevada but it has a CNDDB state rank of S1 (critically imperiled and vulnerable to extirpation from the state due to extreme rarity).The habitat of Mojave milkweed in California includes washes and dry slopes from about 3,000 to 5,100 feet in Mojavean desert scrub and pinyon-juniper woodland (CNPS 2008). In 2008, 202 individuals of Mojave milkweed were mapped in 59 locations mainly in small washes in Ivanpah 1, 2 and 3. Within the project area Mojave milkweed typically grows in small- to medium-sized washes with sandy to gravelly substrates.

Desert Pincushion (Coryphantha chlorantha)

Desert pincushion is a stem succulent found in the Mojave Desert in San Bernardino and Inyo counties, and also occurs in Arizona, Nevada, and Utah. CNDDB currently lists fewer than 25 documented occurrences in California, approximately one-third of which occur in the project area (CNDDB 2009). It has a CNDDB global rank of G2 (imperiled and at high risk of extinction due to a very restricted global range) and a CNDDB state rank of S1 (critically imperiled). In California its habitat is gravelly or rocky carbonate substrates. In California, desert pincushion is known from the Mojave Desert, in San Bernardino and Inyo counties (CNDDB 2009); it also occurs in Nevada, Arizona and Utah. Desert pincushion's distribution in California is apparently restricted to a few mountain ranges in the eastern Mojave Desert, in eastern San Bernardino County and southeastern Inyo County. Desert pincushion is widely scattered throughout the project area. In 2008, 477 individuals of this species were mapped in 177 locations during protocol-level surveys, within Ivanpah 1, 2 and 3, the construction logistics area, and the utility corridor. In 2007, an additional 122 individuals were found in 114 locations. The combined total for 2007 and 2008 is 599 individuals in 291 locations. Most individuals were found in Mojave creosote bush scrub.

Utah Vine Milkweed (Cynanchum utahense)

Utah vine milkweed is a perennial herb found in the Mojave Desert in San Bernardino County and in the Colorado Desert in Riverside, Imperial, and San Diego Counties. This species also occurs in Arizona, Nevada, and Utah (CNDDB 2009). In California its habitat is sandy and gravelly soils, often in washes climbing up through shrubs. The CNDDB electronic files do not track CNPS List 4 species, but two Element Occurrences in the CNDDB paper files were located. Herbarium records noted approximately 42 additional occurrences. In 2008, 991 individuals were found in 146 locations, mainly in

Ivanpah 1 and 2. In 2007, three individuals were mapped in three locations, all within Ivanpah 1. Most individuals were found in small washes in Mojave creosote bush scrub. The total for 2007 and 2008 on the Ivanpah Project site is 994 individuals in 149 locations. In addition, one occurrence was documented in the AFC for the Stirling Energy Systems Solar One Project (SES 2008b).

Nine-Awned Pappus Grass (Enneapogon desvauxii)

Nine-awned pappus grass is a widespread species of the southwestern U.S., Mexico and South America, but the California range of this species is restricted to a small portion of eastern Mojave Desert, in San Bernardino County (CNDDB 2009). It has a CNDDB state rank of S2 (imperiled). It is currently known from fewer than 25 documented occurrences. Habitat of nine-awned pappus grass in California consists of rocky slopes, crevices, calcareous soils, in desert woodland. In the Ivanpah Valley, this species occurs on the often north-facing sides of medium-sized to large washes, and on cobble mounds within and outside of washes that include some calcareous rocks, from 2,900 to 3,400 feet, in Mojave creosote bush scrub. In 2007, no individuals of this species were detected within the ISEGS project area, but in the 2008 surveys 8,145 plants were documented, suggesting that the population varies widely in response to seasonal variation in precipitation and other climate variables.

Parish's Club-Cholla (Grusonia parishii)

The California range of Parish's club-cholla has a CNDDB state rank of S2 (imperiled). Currently, it is known from fewer than 20 occurrences but it has a wide range in California that extends south into Riverside County. Nearly 30 percent of the documented occurrences to date occur within the project area (CNDDB 2009). This stem succulent also occurs in Nevada, Arizona, and possibly Texas. The habitat of Parish's club-cholla within the project area consists of sandy to somewhat gravelly uplands in the larrea-ambrosia sub-type of Mojave creosote bush scrub. Parish's club-cholla is abundant within the ISEGS project area, where it is discontinuously distributed, with most locations found in Ivanpah 1 and 3, and the construction logistics area. This species grows in clones consisting of spreading mats that may form separate patches over time. One 'mat' (dense, clonal clumps) was defined as one individual during the 2007-2008 surveys. In 2008, 196 clumps or mats of Parish's club-cholla were mapped at 47 locations within Ivanpah 1, the construction logistics area, and the utility corridor. In 2007, 143 were mapped within 96 locations in Ivanpah 1 and 3, and the construction logistics area. For 2008 and 2007 combined, 339 individuals were mapped in 143 locations.

Desert portulaca (Portulaca halimoides)

Desert portulaca is a late summer/early fall blooming annual found in Riverside and San Bernardino Counties, and possibly San Diego County. This species also occurs in Nevada, Arizona, Utah, Colorado, New Mexico, Oklahoma, Texas, and Baja California. Habitat of desert portulaca consists of sandy washes and flats, from about 3,000 to 3,600 feet in elevation. Herbarium records noted 16 different occurrences, not including the one collected from the project site. Desert portulaca is a CNPS List 4 species that

has a plant of limited distribution but is not considered rare from a statewide perspective so its distribution is not tracked by CNDDB.

At the ISEGS project area, no individuals of desert portulaca were detected during field surveys conducted in April, May, and June 2007, or in April 2008. However, desert portulaca was observed within the ISEGS project area in October 2007, following rains in August 2007. Quantitative data on the distribution and abundance of desert portulaca within the ISEGS project area are not available, but one individual was detected at the site. The plant's location in the project area was not mapped in the applicant's final botanical report (CH2M Hill 2008i).

4.3.1.1.3 CDFG Sensitive Natural Communities

In addition to special-status species, a search of CDFG's CNDDB revealed the presence of a sensitive natural plant community in the project vicinity: mesquite bosque, a type of desert riparian forest dominated by mesquite (*Prosopis pubescens*). While there are several ephemeral washes of considerable size on the site, their associated vegetation is Mojave wash scrub, a common vegetation type. The nearest occurrence of mesquite bosque was recorded encircling Mesquite Lake, which is approximately five and a half miles north of the northern end of the project site (CNDDB 2009).

4.3.1.1.4 Noxious Weeds

Noxious weeds are species of non-native plants included on the weed lists of the California Department of Food and Agriculture (CDFA 2007), the California Invasive Plant Council, or those weeds of special concern identified by BLM. Noxious weeds were relatively low in abundance and diversity throughout the ISEGS project area. Eight species of invasive weeds were detected during the 2007/2008 floristic surveys (CH2M Hill 2008i), as described below.

Sahara mustard, or African mustard, (*Malcornia africana*) was found at two locations, in Ivanpah 3 and in the utility corridor. This species is of high concern; Cal-IPC has declared this plant highly invasive (Cal-IPC 2006) and recommends that it should be eradicated whenever encountered.

Red brome (*Bromus madritensis* ssp. *rubens*) is widespread in the project area, occurring at 961 widely scattered locations, mostly at disturbed sites. It is an introduced Eurasian grass adapted to microhabitats that can be frequently found at the base of desert shrubs. It can also form carpet cover in pockets of fine grained soils in rough terrain off the bajada. It is widespread and abundant in the Mojave Desert and has been found in the ISEGS site. Seeds from this species can disperse readily and across large distances. Cal-IPC has declared this plant highly invasive (Cal-IPC 2006). Because of its widespread distribution, red brome is not considered feasible for general control.

Cheat grass (*Bromus tectorum*) was found at nine widely scattered locations in the ISEGS site. It is among the most widely distributed invasive plant species in the western U.S. Closely related to red brome, it is adapted to colder steppe and woodland habitats. Cal-IPC has declared this plant highly invasive (Cal-IPC 2006). Because of its widespread distribution, cheat grass is not considered feasible for general control.

Mediterranean grass (*Schismus* spp.) was observed patchily distributed throughout the project site. Cal-IPC has determined that this plant has a limited invasiveness rating in California (Cal-IPC 2006). BLM and other agencies recognize that because of the widespread distribution of Mediterranean grass, this species is not considered feasible to control.

Russian thistle (*Salsola* sp.) was recorded along the Colosseum Road access route. Although all invasive plants share the trait of being adapted to disturbed habitat, Russian thistle or tumbleweed (*Salsola tragus*) particularly tends to be restricted to roadway shoulders and other sites where the soil has been recently disturbed. This species was not observed at the project site, but is a common invader on disturbed sites. After summer rains in 2008, widespread areas on the northern margin of Ivanpah Playa were covered with a thick growth of tumbleweed. Cal-IPC has determined that this plant has a limited invasiveness rating in California (Cal-IPC 2006). There is a high potential that Russian thistle could become established in the construction area and this species should be eradicated if observed.

London rocket (*Sisymbrium irio*) is widespread throughout the warm deserts of North America. It was identified near the project site along Colosseum Road in the southern half of Ivanpah 2. Cal-IPC has declared this plant moderately invasive (Cal-IPC 2006).

Mediterranean tamarisk or saltcedar (*Tamarix ramosissima*) has been observed near the project site; however, it is a riparian plant and is therefore restricted to habitats where there is perennial saturation such as springs and seeps, or runoff from poorly maintained water pipelines or well pumps. Cal-IPC has declared this plant highly invasive (Cal-IPC 2006).

Filaree or storksbill (*Erodium cicutarium*) is a widespread annual species common in disturbed habitats, and was detected at the ISEGS site. It can form dense, transient populations when conditions are suitable. It has a limited overall rating by Cal-IPC, generally because the ecological impacts of the species are minor. Because of its widespread distribution, eradication of filaree is not considered feasible

4.3.1.2 Special Status Plant Species

For the purposes of this discussion, special status species include the following: federally listed, proposed, and federal candidate species (USFWS No Date); state-listed species; and BLM sensitive species (BLM 2004).

Within the project area, there are no known occurrences of federal- or state-listed plant species. The only BLM sensitive species known to occur within the project area is the Rusby's desert mallow; it is also a CNPS species of concern. In the FSA/DEIS, the Energy Commission also identified a number of species of special concern located within the project site, including plants identified as rare by the CNPS (List IB and List 2). CNPS rare plant species were discussed previously.

<u>**Rusby's Desert-Mallow (Sphaeralcea rusbyi var. eremicola)**</u>

Rusby's desert-mallow is a California endemic perennial herb. It is documented globally from less than 30 occurrences in Inyo and San Bernardino Counties in the Death Valley Region and Eastern Mojave Desert in the Clark Mountain Range. It has a CNDDB state

rank of S2 (imperiled). It occurs in the Clark Mountain Range at Ivanpah Springs, on desert slopes and gravelly sandy washes and often in carbonate and limestone substrate, extending into the project area. Although this species was not detected during the 2007 surveys, surveys in 2008 detected 15 individuals at 12 locations in Mojave creosote bush scrub habitat within Ivanpah 1, 2, and 3, the construction logistics area, and the utility corridor.

4.3.1.3 Wildlife

Common Wildlife

The project area consists primarily of Mojave creosote scrub and other native vegetation communities that are largely intact and relatively free from noxious and invasive weeds. Native vegetation and natural topography provides habitat to a variety of wildlife species.

The native habitat within the project area provides host plants for numerous insect and invertebrate species. Spiders, scorpions, beetles, crickets, flies, butterflies, and bees exist in the area and provide a food base for other species. Nine uncommon species potentially could occur at the project site, including the Mojave Desert blister beetle (*Lytta insperata*, Federal species of concern), brown tassel trigonoscuta weevil (*Trigonoscuta brunnotesselata*), desert green hairstreak butterfly (*Callophrys comstocki*), monarch butterfly (*Danaus plexippus*), Mojave dotted blue butterfly (*Euphilotes mojave*), San Emigdio blue butterfly (*Plebulina emigdionis*), cockoo wasp (*Ceratochrysis griselli*), and two bee species (*Habropoda pallida* and *Neolarra alba*). No special status insect or invertebrate species with regulatory protection are known to occur within the project area.

Reptiles detected during the 2007/2008 surveys include desert tortoise, side-blotched lizard (*Uta stansburiana*), desert iguana (*Dipsosaurus dorsalis*), long-nosed leopard lizard (Gambelia wislizenii), western whiptail (*Cnemidophorus tigris*), zebra-tailed lizard (*Callisaurus draconoides*), common collared lizard (*Crotaphytus collaris*), and sidewinder (*Crotalus cerastes*). While the banded Gila monster (*Heloderma suspectum cinctum*) was not detected during the surveys, the habitat is suitable for Gila monster and this large, seldom-seen lizard could occur in the project vicinity.

The ISEGS project area provides forage, cover, roosting, and nesting habitat for a variety of bird species. Non-game birds include a variety of migratory songbirds and raptors, many of which are protected by the MBTA and are included on the USFWS BCC list. Resident and migratory birds occur at the ISEGS site during the winter, migratory, and breeding seasons, including birds such as Say's phoebe (*Sayornis saya*), black-throated sparrow (*Amphispiza bilineata*), white-crowned sparrow (*Zonotrichia leucophrys*), sage sparrow (*Amphispiza belli*), blue-gray gnatcatcher (*Polioptila caerulea*), cactus wren (*Campylorhynchus brunneicapillus*), verdin (*Auriparus flaviceps*), western kingbird (*Tyrannus verticalis*), sage thrasher (*Oreoscoptes montanus*), house finch (*Carpodacus mexicanus*), lesser nighthawk (*Chordeiles acutipennis*), common ground-dove (Columbina passerina), mourning dove (*Zenaida macroura*), Gambel's quail (*Callipepla gambelii*), American kestrel (*Falco sparverius*), burrowing owl (*Athene cunicularia*), and red-tailed hawk (*Buteo jamaicensis*).

The diverse landscape features, soil types, vegetation, and prey availability at the ISEGS project area is likely to attract a variety of mammal species such as Audubon's cottontail (*Sylvilagus audubonii*), black-tailed jackrabbit (*Lepus californicus*), whitetail antelope squirrel (*Ammospermophilus leucurus*), desert kit fox (*Vulpes macrotis*), and coyote (*Canis latrans*). Given the proximity of the Clark Mountains, it is likely that mule deer (*Odocoileus hemionus hemionus*) and desert bighorn sheep (*Ovis canadensis nelsoni*) use the upper elevations of the valley, including the ISEGS project area, as movement corridors and foraging habitat (CH2M Hill 2008b).

4.3.1.4 Special-Status Wildlife Species

Reptiles

Banded Gila Monster (Heloderma suspectum cinctum)

The banded Gila monster is considered rare in California (Lovich and Beaman 2007) with only 26 credible records of the species documented in California within the past 153 years. This large and distinct looking lizard is difficult to observe even in areas where they have been recently recorded. As a result, little is known about this species' distribution, population status, and life history in California.

Most of the historical observations in California occurred in mountainous areas of moderate elevations with rocky, incised topography, in large and relatively high ranges as well as riparian areas (Lovich and Beaman 2007). Despite the widespread localities of potential habitat throughout the California desert, the few documented observations suggest the California populations appear to be confined to the eastern portion of the California desert (Lovich and Beaman 2007), and the current distribution is apparently a function of summer rainfall. As reported by Lovich and Beaman (2007), all California Gila monster observations occurred east of the 116° longitude in areas that received at least 25 percent of their annual precipitation during the summer months. Throughout their range, Gila monsters appear to be most active during or following summer rain events. Gila monsters have been recorded in the adjacent Mojave National Preserve and the Clark Mountains (Lovich and Beaman 2007). The closest confirmed observation of a Gila monster to the project area was collected within the Mojave National Preserve in 1962 on the eastern slope of the Clark Mountains near Ivanpah Springs (Persons and Nowak 2007). Another incidental observation from the area includes finding Gila monster remains beneath a redtail hawk nest near Primm, Nevada (CH2M Hill 2008l).

Like most areas of the desert, rain fall within the Ivanpah Valley is variable but mean annual precipitation is approximately 4 to 7 inches. The distribution of rainfall is also bi-modal with winter peak precipitation typically in February and summer peak rain falls in August. Runoff from the steep surrounding mountains is rapid and flash floods are common events as most of the storm water in the Ivanpah Valley drains across the alluvial fan to Ivanpah and Roach Dry Lakes. Although the Mojave Desert is the driest of the North American deserts, the east Mojave does receive a large percentage of its annual precipitation from summer "monsoon" rains. As reported in Hereford et al. (2001) the relative abundance of cacti, many yuccas, agaves, and agave-like plants tend to be greater where warm-season rainfall is abundant. This is true of the ISEGS project area where cacti are extremely abundant. Although the project area does not receive near

the amount of the rainfall as the Sonoran Desert where Gila monsters are more prevalent, the Ivanpah Valley does mimic the climatic conditions that appear to be favorable to Gila monster presence (CH2M Hill 2008l).

Gila monsters potentially could occur in the ISEGS project area. Most likely areas for Gila monster within the project area include 1) the metamorphic hill, immediately adjacent to the southeastern boundary of Ivanpah 3 (CH2M Hill 2008l); 2) the northeastern corner of Ivanpah 2; and 3) utility interconnections south of the base of the Clark Mountains (CH2M Hill 2008l). Gila monsters may venture from those rockier areas adjacent to the project area where they would likely take refuge in small crevices and caves to forage within the spreading arroyo on which the proposed project is located (CH2M Hill 2008l).

Desert Tortoise (Gopherus agassizii)

The desert tortoise's range includes the Mojave Desert region of Nevada, southern California, and the southwest corner of Utah and the Sonoran Desert region of Arizona and northern Mexico. The desert tortoise range is divided into Mojave and Sonoran populations. The Ivanpah Valley supports a portion of the Mojave population, primarily inhabiting creosote bush-dominated valleys with adequate annual forbs for forage.

Desert tortoises have been known to live up to 70 years or more but the typical adult likely lives 25 to 35 years (in USFWS 1994). Like many long-lived species, the tortoise has a relatively slow rate of reproduction, and achieves breeding status at 15 to 20 years of age. Egg-laying occurs primarily from April to July (Rostral et al. 1994; USFWS 1994); the female typically lays 2-14 eggs (average 5-6) eggs in an earthen chamber excavated near the mouth of a burrow or under a bush (Woodbury and Hardy 1940; USFWS 1994). The eggs typically hatch 90 to 120 days later, between August and October.

Desert tortoise activity is seasonally variable, and in California peak adult and juvenile activity typically coincides with the greatest annual forage availability during the early spring and summer. However, tortoises will emerge from their burrows at any time of year when the weather is suitable. Hatchling desert tortoises typically become active earlier than adults do and their greatest activity period can be expected between late winter and spring. During active periods, tortoises feed on a wide variety of herbaceous plants, including cactus, grasses, and annual flowers (USFWS 1994).

Annual home ranges have been estimated between 10 and 450 acres and are age, sex, seasonal, and resource density dependent (USFWS 1994). Although adult males can be aggressive toward each other during the breeding season, there can be a great deal of overlap in individual home ranges (USFWS 1994). More than 1.5 square miles of habitat may be required to meet the life history needs of a tortoise and individuals have been known to travel as much or more than 7 miles at a time (BLM 2001). In drought years, tortoises can be expected to wander farther in search of forage. During their active period, desert tortoises retreat to shallow burrows and aboveground shade to escape the heat of the day, and will also retire to burrows at nighttime. Desert tortoises are primarily dormant in winter in underground burrows and sometimes congregate in communal dens.

Desert tortoise populations have declined throughout their range because of loss and degradation of habitat caused by urbanization, agricultural development, military training, recreational use, mining, and livestock grazing. The loss of individual desert tortoises to increased predation by common ravens, collection by humans for pets or consumption, collisions with vehicles on paved and unpaved roads, and mortality resulting from diseases also contributed to declines.

Critical Habitat Designation and Desert Tortoise Recovery Plan

The USFWS desert tortoise recovery plan is the principal strategy for recovery and delisting of this species (USFWS 1994). As part of the recovery strategy, the USFWS designated critical habitat for the desert tortoise in portions of California, Nevada, Arizona, and Utah (USFWS 1994). Critical habitat is a term defined by the federal Endangered Species Act referring to areas designated by the USFWS that are essential for the conservation of threatened or endangered species and may require special management and protection (USFWS 2005). The proposed project is not within designated critical habitat for any species, but is located approximately five miles north of the Ivanpah Critical Habitat Unit for desert tortoise, just north of the I-15 and Route 164 (Nipton Road) interchange.

The recovery plan (USFWS 1994) identifies six subpopulations, or "Recovery Units" based on genetics, morphology, behavioral patterns, and ecosystem types. Within each Recovery Unit, one to four DWMAs were developed to provide "reserve level" protection for the tortoise by protecting genetic factors, minimum population sizes, and sufficient size of the reserve areas (USFWS 1994). Within the DWMAs, critical habitat was designated to identify areas containing key biological and physical attributes that are essential to the desert tortoise's survival and conservation, such as space, food, water, nutrition, cover, shelter, and reproductive sites. As part of the actions needed to accomplish the recovery of this species, land management goals within all DWMAs include restriction of human activities that adversely affect desert tortoises (USFWS 1994).

The 1994 and draft 2008 Desert Tortoise Recovery Plans (USFWS 1994, 2008) emphasize aggressive management within "tortoise conservation areas" a term that encompasses critical habitat, Desert Wildlife Management Areas, Areas of Critical Environmental Concern, and other conservation areas or easements managed for desert tortoises. While the recovery plans suggest that land managers focus the most aggressive recovery efforts toward tortoise conservation areas, they also emphasize that land managers should strive to limit the loss of desert tortoise habitat outside conservation areas as much as possible (USFWS 2008a). The recovery plans recognize that activities occurring on lands beyond the boundaries of existing tortoise conservation areas can affect tortoise populations as well as the effectiveness of conservation actions occurring within the conservation area boundaries. While recovery efforts may be prioritized within existing desert tortoise conservation areas, populations, habitats, and actions outside of these areas may also contribute to, or hamper, recovery of the species.

Desert Tortoise Habitat Within Project Area

The proposed ISEGS project would be constructed within the Northeastern Mojave Recovery Unit (USFWS 1994). When the 1994 recovery plan was issued, some of the highest known tortoise densities were in southern Ivanpah Valley, with 200 to 250 adults per square mile (USFWS 1994). These 1990s densities were less than estimates for the southern Ivanpah Valley in the 1970s; a decline has been attributed to raven predation (USFWS 1994). Densities for the northern Ivanpah Valley in the 1990s were typically less than 50 adults per square mile (USFWS 1994). According to the 1994 recovery plan, tortoise densities in the Ivanpah Valley DWMA were estimated between 5 and 250 adult tortoises per square mile and the area was given a threat level of 3 out of 5 (5 = extremely high) (USFWS 1994). The Desert Tortoise Recovery Planning Assessment Committee (DTRPAC) recommended revising the threat level for the Ivanpah Valley DWMA to a 4 to reflect 2003 conditions (DTRPAC 2004). Desert tortoises are distributed throughout Ivanpah Valley with the exception of the dry lakes and developed areas. According to the Northern and Eastern Mojave Planning Area EIS (BLM 2002), the non-lakebed portion of Ivanpah Valley area is considered excellent quality tortoise habitat with some of the highest population densities in the East Mojave.

The ISEGS project area provides high quality habitat for this species, with low levels of disturbance and high plant species diversity (CDFG 2008a). The desert tortoise population in this part of the Ivanpah Valley is also unique because it is the highest elevation at which this species is known to reside in the state (CDFG 2008a). The 2007/2008 protocol desert tortoise surveys found 25 live desert tortoises, 97 desert tortoise carcasses, 214 burrows, and 50 other tortoise sign (CH2M Hill 2007). Tortoise sign and density was greatest in Ivanpah 1 at the southern boundary of the project site and was less dense as the survey moved towards the Clark Mountains and Ivanpah 3.

Desert tortoises also occur along the ISEGS linear facilities (CH2M Hill 2007). Surveys of the fiber optic route by EPG, Inc. (2008) (cited in CH2M Hill 2007) confirmed that the entire route is within desert tortoise habitat. Protocol level surveys were not conducted. However, in surveying the fiber optic route, three tortoise burrows and a tortoise shell were detected.

Birds

Western Burrowing Owl (Athene cunicularia hypugaea)

Western burrowing owls inhabit arid lands throughout much of the western United States and southern interior of western Canada (Haug et al. 1993). In the Mojave Desert region, and in many other areas, this species has declined because of habitat modification, poisoning of its prey, and introduced nest predators. The burrowing owl is diurnal and usually non-migratory in this portion of its range.

Burrowing owls are unique among the North American owls in that they nest and roost in abandoned burrows, especially those created by California ground squirrels, San Joaquin kit fox, desert tortoise, and other wildlife. Burrowing owls have a strong affinity for previously occupied nesting and wintering habitats. They often return to burrows used in previous years, especially if they were successful at reproducing there in previous years (Gervais et al. 2008). The southern California breeding season (defined

as from pair bonding to fledging) generally occurs from February to August with peak breeding activity from April through July (Haug et al. 1993).

In the Mojave Desert, burrowing owls generally occur at low densities in scattered populations, but they can be found in much higher densities near agricultural lands where rodent and insect prey tend to be more abundant (Gervais et al. 2008). Burrowing owls tend to be opportunistic feeders. Large arthropods, mainly beetles and grasshoppers, comprise a large portion of their diet. Small mammals, especially mice and voles (*Microtus*, *Peromyscus*, and *Mus* spp.), also are important food items. Other prey animals include reptiles and amphibians, young cottontail rabbits, bats, and birds, such as sparrows and horned larks. Consumption of insects increases during the breeding season (Haug et al. 1993).

This species was observed on the ISEGS site during the 2008 surveys but not in 2007. Suitable habitat was identified. No owls, feathers, active burrows, pellets or whitewash were detected. The size and status of burrowing owl population at the project site is not known. The ISEGS site provides suitable foraging and breeding habitat for this species.

Golden Eagle (Aquila chrysaetos)

Throughout most of the western United States golden eagles are mostly year-round residents, breeding from late January through August with peak activity in March through July (Kochert et al. 2002). Migratory patterns are usually fairly local in California where adults are relatively sedentary, but dispersing juveniles sometimes migrate south in the fall. This species is generally considered to be more common in southern California than in the northern part of the state (USFS 2008).

Habitats for this species typically include rolling foothills, mountain areas, and deserts. Golden eagles need open terrain for hunting and prefer grasslands, deserts, savanna, and early successional stages of forest and shrub habitats. Golden eagles primarily prey on lagomorphs and rodents but will also take other mammals, birds, reptiles, and some carrion (Kochert et al. 2002). This species prefers to nest in rugged, open habitats with canyons and escarpments, with overhanging ledges and cliffs and large trees used as cover. Golden eagles were detected on the ISEGS project site, but are unlikely to nest there because of the absence of suitable nesting habitat. However, the Clark Mountains, just north of the project area, provides suitable nesting habitat for this species, and given the observation of golden eagles, it is likely that the project area is suitable foraging habitat. There are three golden eagle territories within 10 miles of the proposed project area, one of which is considered active and two of which are potentially active. The active eagle nest identified in 2010 is located in the Clark Mountains (BLM unpublished data), 4.3 miles away from the proposed project boundary. The other two territories are located 4.7 and 8.5 miles away.

Although studies are currently in progress, the home range size for golden eagles in arid habitats is unknown. Golden eagles have been demonstrated to forage primarily within 4 miles of the center of their territories in mesic environments (McGrady et al. 2002), but this distance may be longer in xeric habitats, up to 10 miles.

Loggerhead Shrike (Lanius ludovicianus)

Loggerhead shrikes are uncommon residents throughout most of the southern portion of their range, including southern California. In southern California they are generally much more common in interior desert regions than along the coast (Humple 2008). In the Mojave Desert this species appears to be most numerous in flat or gently sloping deserts and desert/scrub edges, especially along the eastern slopes of mountainous areas (Humpel 2008). Loggerhead shrikes initiate their breeding season in February and may continue with raising a second brood as late as July; they often re-nest if their first nest fails or to raise a second brood (Yosef 1996).

This species can be found within lowland, open habitat types, including creosote scrub and other desert habitats, sage scrub, non-native grasslands, chaparral, riparian, croplands, and areas characterized by open scattered trees and shrubs. Fences, posts, or other potential perches are typically present. In general, loggerhead shrikes prey upon large insects, small birds, amphibians, reptiles, and small rodents over open ground within areas of short vegetation, usually impaling prey on thorns, wire barbs, or sharp twigs to cache for later feeding (Yosef 1996). Loggerhead shrikes were detected on the ISEGS site and are year-round residents, using the site for nesting, foraging, and cover.

Le Conte's Thrasher (Toxostoma lecontei)

This species inhabits some of the hottest and driest habitats in the arid southwest, including the Mojave Desert where they occur year-round. Preferred habitats include sparse desert scrub, alkali desert scrub, and desert succulent scrub habitats with open desert washes. They seek gentle to rolling slopes bisected by dry desert washes, conditions found on alluvial fans that are found in the project area. The Le Conte's thrasher population densities are among the lowest of passerine (perching) birds, estimated at less than five birds per square kilometer in optimal habitats (Fitton 2008a). This low population density decreases the probability of their detection during field surveys. This species requires areas with an accumulated leaf litter under most plants as cover for its preferred arthropod prey; they also feed on seeds, insects, small lizards, and other small vertebrates. LeConte's thrashers were detected during the surveys. They are year-round residents at the ISEGS site and use the site for nesting, foraging, and cover.

Crissal Thrasher (Toxostoma crissale)

Crissal thrashers are non-migratory residents ranging from southern Nevada and southeastern California to western Texas and central Mexico, and they are known to occur in the Mojave Desert in the vicinity of the Clark Mountains (Fitton 2008b). This species prefers habitats characterized by dense, low scrubby vegetation, such as desert and foothill scrub and riparian brush including higher elevation arroyos of the Mojave Desert, normally near the upper limit of desert scrub vegetation as it transitions into pinyon-juniper woodland. The nest of this species typically consists of an open cup of twigs, lined with finer vegetation, and placed in the middle of a dense shrub. Loss of habitat to clearing for agriculture or urban and suburban development threatens some

populations. Crissal thrashers were detected during the surveys and are likely to be year-round residents at the ISEGS site, using the site for nesting, foraging, and cover.

Vaux's Swift (Chaetura vauxi)

Most Vaux's swifts observed in the Mojave Desert are passing through, and this species is not known to breed in San Bernardino County or elsewhere in the Mojave Desert (Hunter 2008). Very few nests have been found so their breeding range has been inferred from sightings of birds flying over potential nesting areas during their nesting season, in June and July. Vaux's swifts prefer to nest in the hollows formed naturally inside of large old conifer trees, especially snags, which are entirely lacking from the project area. This species was detected in the project area, but was likely a migrant rather than a resident. The ISEGS project area does not provide nesting habitat for Vaux's swift.

Brewer's Sparrow (Spizella breweri)

This species is a fairly common summer resident and breeder east of the Cascade-Sierra Nevada crest in mountains and higher valleys of the Mojave Desert. In summer, Brewer's sparrow often finds cover in sagebrush in extensive stands with moderate canopy unbroken by trees, while similar shrub habitats, such as bitterbrush, are used to a lesser extent. This species breeds in treeless shrub habitats with moderate canopy, especially in sagebrush. In winter, this species is common in open desert scrub and cropland habitats of the southern Mojave and Colorado deserts, usually in areas with some herbaceous understory. Brewer's sparrows were detected during the surveys and are likely to be year-round residents at the ISEGS site, using the site for nesting, foraging, and cover.

Bendire's thrasher (Toxostoma bendirei)

The Bendire's thrasher was not found within the project site during 2007 and 2008 surveys. Several sightings of Bendire's thrasher were observed in the mountainous region of the Mojave National Preserve (BLM 2009a). Breeding habitat is highly variable, but does occur within the Mojave and Great Basin deserts within dense Mojave Desert scrub with Joshua trees, Spanish bayonet, Mojave yucca, cholla cactus, or other succulents. There is the potential for Bendire's thrasher to occupy high quality habitat within the project area.

Gray Vireo (Vireo vicinior)

The gray vireo was not found within the project site during 2007 and 2008 surveys. Breeding habitat consists primarily of low density pinyon-juniper woodlands, often along the margin of this habitat where it mixes with shrublands of greater density. Because the habitats typically utilized by gray vireo are uncommon or absent from the project site, this species is considered to have low potential for occurrence on the project site and was eliminated from further analysis.

Mammals

Special Status Bat Species

Pallid bat (*Antrozous pallidus*), Townsend's big-eared bat (*Corynorhinus townsendii*), and long legged myotis (*Myotis volans*) are special status bat species that have been reported in the project vicinity (Brown 2008, CNDDB 2008). The pallid bat is a locally common species of low elevations in California, occurring throughout the state from Shasta to Kern counties except in the high Sierra. The long-legged myotis is common in some habitats, but is uncommon in desert habitats. Both species occupy a wide variety of habitats is occupied, including grasslands, shrublands, woodlands, and forests from sea level up through mixed conifer forests. Pallid bat is most common in open, dry habitats with rocky areas for roosting and is a yearlong resident in most of the range. Long-legged myotis are most common in wooded areas. Both bat species use caves, rock crevices, tree bark, and mines for day roosts.

Townsend's big-eared bat is found throughout California in all but subalpine and alpine habitats, and may be found at any season throughout its range. Once considered common, Townsend's big-eared bat now is considered uncommon in California. It is most abundant in mesic habitats, and uses caves, mines, tunnels, buildings, or other human made structures for roosting. The Townsend's big-eared bat captures their prey in flight using echolocation, or by gleaning from foliage, with small moths being the principal food of this species. Extremely sensitive to disturbance of roosting sites, a single visit may result in the abandonment of a maternity roost.

Pallid bat, long-legged myotis, and Townsend's big-eared bats could use the project area for foraging and might use nearby mine shafts for roosting. The AFC (CH2M Hill 2007) correctly states that no mines exist on site, but a mine shaft in the limestone hill immediately west of Ivanpah 3 was observed. While no direct impacts to the mine would occur from the project, BLM staff assessed the level of bat activity at the mine shaft by conducting a visual night survey on June 23, 2008. At least five bats were observed from the limestone hill, and one individual flew into and out of the mine shaft (Grant 2008). Species identification was not possible with this type of survey. Although standard acoustic surveys would be able to distinguish most species, they would not be successful in detecting Townsend's big-eared bat (Brown 2008).

American Badger (Taxidea taxus)

American badgers were once fairly widespread throughout open grassland habitats of California. They are now uncommon, permanent residents throughout most of the state, with the exception of the northern North Coast area. Known to occur in the Mojave Desert, they are most abundant in the drier open stages of most shrub, forest, and herbaceous habitats with friable soils. Badgers are generally associated with treeless regions, prairies, parklands, and cold desert areas. Cultivated lands have been reported to provide little usable habitat for this species. They feed mainly on small mammals, especially ground squirrels, pocket gophers, rats, mice, and chipmunks. This species captures some of its prey above ground foraging on birds, eggs, reptiles, invertebrates, and carrion. Its diet will shift seasonally and yearly depending upon prey availability. This species is somewhat tolerant of human activities.

Badgers are generally solitary animals that are primarily active at night. They dig multiple burrows in friable soils within their home range, with the dens located up to 10 feet below the grounds surface. Their home range size depends on the sex, season, and geographic region, varying between 300 to 1,500 acres per animal. Badgers undergo torpor in winter months. The ISEGS project site provides suitable foraging habitat and denning sites for American badger, and it was detected during the 2007 surveys.

Nelson's Bighorn Sheep (Ovis canadensis nelsoni)

The Nelson's bighorn sheep habitat includes the Transverse Ranges through most of the desert mountain ranges of California and adjacent Nevada and northern Arizona to Utah. This species is widely distributed from the White Mountains in Mono County south to the Chocolate Mountains in Imperial County, and is known to occur in the Clark Mountains (CH2M Hill 2008b). Essential habitat for bighorn sheep includes steep, rocky slopes of desert mountains, termed "escape terrain". Their agility on steep rocky terrain is an adaptation used to escape predators such as coyotes, eagles, and cougars (Wehausen 1992).

Bighorn sheep graze on grasses and browse shrubs, particularly in fall and winter, and seek minerals at natural salt licks. In the spring, when annual plants are available, bighorn tend to disperse downhill to bajadas and alluvial fans to forage. Bighorn sheep have a large rumen, relative to body size, which allows digestion of grasses, even in a dry state (Hanly 1982). This gives them flexibility to select diets that optimize nutrient content from available forage. Consequently, bighorn sheep feed on a large variety of plant species and diet composition varies seasonally and among locations. While diet quality in the Mojave Desert varies greatly among years, it is most predictably high in late winter and spring (Wehausen 1992), and this period coincides with the peak of lambing. Desert bighorn have a long lambing season that can begin in December and end in June in the Mojave Desert, and a small percentage of births commonly occur in summer as well (Wehausen 1992).

Radio telemetry studies of bighorn sheep in various southwestern deserts, including the Mojave Desert of California, have found considerable movement of these sheep between mountain ranges (Bleich et al. 1990). Consequently, intermountain areas of the desert floor that bighorn traverse between mountain ranges can be as important to the long-term viability of populations as are the mountain ranges themselves (Schwartz et al. 1986, Bleich et al. 1990).

Surface water is another element of desert bighorn habitat considered essential to population health. Male and female bighorn sheep inhabiting desert ecosystems can survive without consuming surface water (Krausman et al. 1985), and males appear to drink infrequently in many situations; however, there are no known large populations of bighorn sheep in the desert region that lack access to surface water. It is common for males and females to segregate and occupy different habitats outside the breeding season (Bleich et al. 1997). Females tend to choose particularly steep, safe areas for bearing and initial rearing of lambs. Areas of steep limestone are commonly preferred lambing areas if available. Males frequently occupy much less precipitous habitat during the lamb-rearing season (Bleich et al. 1997).

The CNDDB records indicate that this species was documented in the vicinity of the ISEGS project in 1986, when approximately 150 sheep were recorded approximately 2.9 miles west and northwest of the project area in the Clark Mountains (CH2M Hill 2007). Jaeger's (1994) studies of bighorn sheep in the Kingston and Clark Mountain ranges provide some more recent information on the demography, habitat use, behavior and movement patterns of the Clark Mountain population of Nelson's bighorn sheep. Jaeger (1994) estimated 58 ewes in the Clark Mountain population in 1991 and 1992, and calculated the ewe to ram ratio to be approximately 96:100 (Jaeger 1994). Jaeger (1994) found that from 1991 through 1993 the ewe population in the Clark Mountain Range declined due to poor recruitment of lambs combined with mountain lion predation on adults. Jaeger (1994) also studied seasonal movements of big horn sheep, and determined that radio-collared ewes in the Clark Mountain Range moved seasonally between Clark Mountain and the State Line Hills, a part of the Spring Range in Nevada, to the northeast (Jaeger 1994). Bighorn also utilized the Mesquite Range, which lies to the northwest of the Clark Mountains.

No studies are available that would confirm the presence of Nelson's bighorn sheep in the project area. Given the proximity of the Clark Mountains, it is likely that bighorn sheep move down into the upper elevations of the Ivanpah Valley along the alluvial fan, including the ISEGS project area, to forage (CH2M Hill 2008b p. 3-7). Alluvial fans near steep rocky terrain can provide crucial foraging habitat for big horn sheep. For example, ewes at the end of gestation that need nutrients may come down from steep, rocky terrain looking for higher quality forage. They might use areas like the project site for only three weeks, but those three weeks are critical. The Ivanpah Valley might also provide important movement corridors for deer and bighorn sheep (CH2M Hill 2008b p. 3-7). CDFG has noted that wildlife corridors are present through and adjacent to the ISEGS site, and have expressed concern that the project could adversely affect bighorn sheep (CDFG 2008b). However, no studies are available documenting bighorn use of the Ivanpah Valley as a migratory area.

4.3.2 Environmental Consequences

Methodology

Impact analyses typically characterize effects to plant communities as temporary or permanent, with a permanent impact referring to areas that are paved or otherwise precluded from restoration to a pre-project state. In the Mojave Desert ecosystem the definition of permanent impacts needs to reflect the slow recovery rates of its plant communities. Natural recovery rates from disturbance in these systems depend on the nature and severity of the impact. For example, creosote bushes can resprout a full canopy within five years after damage from heavy vehicle traffic (Gibson et al. 2004), but more severe damage involving vegetation removal and soil disturbance can take from 50 to 300 years; complete ecosystem recovery may require over 3,000 years (Lovich and Bainbridge 1999). In this analysis, an impact is considered temporary only if there is evidence to indicate that pre-disturbance levels of biomass, cover, density, community structure, and soil characteristics could be achieved within five years.

Unless otherwise indicated, the acreages provided below for impacts are considered permanent.

For each of these NEPA impacts identified mitigation measures would be implemented during all appropriate phases of the project. Those measures would include a combination of the following:

- Measures that have been proposed by the applicant;
- Conditions of Certification proposed by Energy Commission staff;
- Regulatory requirements of federal, state, and local agencies;
- USFWS mitigation measures identified in the Biological Opinion; and
- Additional BLM-proposed mitigation measures not otherwise specified in the requirements above.

These requirements are generically referred to as "mitigation measures" throughout this FEIS, and those associated with Biological Resources are described in detail in Section 4.3.7. Because these mitigation measures are derived from a variety of sources, they also are required, and their implementation regulated, by the various agencies. In general, most of these mitigation measures are required by agencies other than BLM, and although their application and expected effectiveness in addressing impacts are discussed in this FEIS, they would not be included within BLM's required conditions of approval in the ROD for this proposed project. However, in some cases, BLM has identified potential impacts that would not be addressed by the other requirements. In those cases, **Table 4.0-1** defines which of the mitigation measures are adopted by BLM staff for inclusion as BLM-required conditions of approval in the ROD for this proposed project.

4.3.2.1 Proposed Project

4.3.2.1.1 Vegetation Impacts

<u>Construction Impacts</u>

Construction would cause the surface disturbance of 4,073 acres. **Table 4.3-2** summarizes the acreage of permanent and temporary impacts as a result of the construction of ISEGS project features. Additional land disturbance beyond the project site boundaries would be associated with the gas line tap station and its construction (1.26 acres), the gas line and its construction from the tap station to the edge of Ivanpah 3 (2.30 acres), the new dirt road to the mining claim (0.41 acres), and construction and paving of a portion of Colosseum Road from the Primm Valley Golf Club to the project (9.69 acres) (CH2M Hill 2009b).

Table 4.3-2
Permanent and Temporary Disturbance of BLM Land

Facility	Acres
Permanent Disturbance	
Ivanpah 1	913.5
Ivanpah 2	920.7
Ivanpah 3	1,836.3
Substation	16.1
Administration/warehouse & parking	8.9
Kern River Gas Line Tap Station (100' X 150')	0.3
Southwest Gas Metering Set for Ivanpah 1 & 2 (20' X 40')	0.02
Groundwater Wells [10' x 10' area for 2 supply wells & 1 monitoring well]	0.01
Transmission Towers (8' x 8' area every 750 feet)	0.01
Linear Facilities (Colosseum Road, Gas, Water & Transmission Lines)	16.9
Subtotal – Permanent Disturbance	**3,712.7**
Temporary Disturbance	
Main Construction Laydown Area	260.0
Equipment Laydown and Wash Area	21.5
Contractor Trailers	20.1
Colosseum Road Improvement (100-ft wide construction corridor from Golf Club to Ivanpah 2, less asphalt road)	12.4
Southwest Gas construction laydown	5.0
Gas line (75' wide construction disturbance from tap to Ivanpah 3 for 2,011 feet)	2.9
Kern River Gas Line tap construction area (200' x 200')	0.9
Adjustment for Roads	(1.8)
Subtotal – Temporary Disturbance	**321.0**
Existing Transmission Line Corridor (within Construction Logistics Area)	38.9
Land Use	**4,073**

Source: CH2M Hill 2009a

The revised ISEGS project reflects a LID approach and the applicant has expressed their intent to minimize disturbance of vegetation during construction and operations (CH2M Hill 2009a). However, the applicant has provided only a conceptual scenario of how vegetation would be treated during construction and operation. Clearing and grubbing, where shrubs and roots are removed, would be performed for permanent access roads in each of the three ISEGS units, in the power blocks, and in common areas where the existing topography requires modification to provide access for installation equipment and materials during construction (CH2M Hill 2009a).

Disturbance of the soil's surface caused by construction traffic and other activities would result in increased wind erosion of the soil. Aeolian transport of dust and sand can result

in the degradation of soil and vegetation over a widening area (Okin et al. 2001). Dust can have deleterious physiological effects on plants and may affect their productivity and nutritional qualities. The destruction of plants and cryptobiotic soil crusts by windblown sand and dust exacerbates the erodibility of the soil and accelerates the loss of nutrients (Okin et al. 2001). Cryptobiotic crusts are fragile layers of soil containing bacteria, algae, and lichens. These crusts fix nitrogen in soils, help soils retain moisture, and stabilize soils against wind erosion. These biotic soil crusts would be adversely impacted by construction and operational activities, and recovery times are expected to require decades. The impacts of increased dust and other construction impacts would be minimized with implementation of mitigation measure **BIO-11**, and with mitigation measures **AQSC3 and AQ-SC-7** and **Soil and Water-1** that would require selection and application of chemical dust suppressants that would not adversely affect vegetation.

Construction activities and soil disturbance could introduce new noxious weeds to the ISEGS site and linear facilities, and could further spread weeds already present in the project vicinity. The spread of invasive plants is a major threat to biological resources in the Mojave Desert because non-native plants can displace native plants, increase the threat of wildfire, and supplant wildlife foods that are important to desert tortoise and other herbivorous species. The weeds of highest concern in the general area include Sahara mustard and salt cedar (CH2M Hill 2008b). Red brome and other ubiquitous weeds are also present; however, because of the widespread nature of these weeds, control is considered impracticable.

Cheat grass, red brome, and Mediterranean grass are already present in the project area and are expected to increase as a result of construction- and operation-related disturbance. The proliferation of non-native annual grasses such as these has dramatically increased the fuel load and frequency of fire in many desert ecosystems (Lovich and Bainbridge 1999). Unlike other ecosystems in California, fire was not an important part of the Mojave Desert ecosystems and most perennials are poorly adapted to even low-intensity fires, and the animals that coevolved are not likely to respond favorably to fire either. The potential spread or proliferation of non-native annual grasses, combined with the proximity to ignition sources could potentially increase the risk of fire, and the effects to these poor-adapted desert communities would be harmful, particularly to cacti and most native shrubs species. Burned creosote and other native shrubs are typically replaced by short-lived perennials and non-native grasses (Brown and Minnich 1986).

To avoid and minimize the spread of existing weeds and the introduction of new ones, an active weed management strategy and control methods must be implemented. The applicant has provided a draft Weed Management Plan (CH2M Hill 2008c) to avoid and minimize the adverse effects of noxious weeds. BLM concurs with the recommendations in the applicant's weed management plan, and its requirements are incorporated into mitigation measure **BIO-13**. The Weed Management Plan includes a discussion of weed eradication and control methods, preventative measures to be implemented during construction (for example, limiting the size of disturbance, establishing wash stations for construction vehicles, using only weed-free products for erosion control) and long-term reporting requirements.

Operations Impacts

Operation of the proposed project would affect 3,713 acres. Effects on plant communities during operations include soil compaction, changes to the soil structure by use of dust suppressants, and changes in the distribution of precipitation falling on the solar fields. During precipitation events heliostats would be placed in the flat horizontal position. Precipitation runoff would concentrate along the dripline below the heliostats rather than being uniformly distributed, changing the soil water content. Mirror wash water would similarly concentrate along the drip line below the heliostats, causing minor erosion of the soil at the drip line and promoting growth of weeds.

In an attempt to assess the impacts of mowing the applicant conducted some preliminary studies at the project site (CH2M Hill 2009m). The researchers clipped seven species (burrobush, creosote bush, cheesebush, pencil cactus, silver cholla, Nevada Mormon tea, and Mojave yucca) at the project site in March 2009 and evaluated them for regrowth and vigor in April 2009. The 35 clipped plants showed vigorous resprouting following mowing (CH2M Hill 2009m). The results of this study indicated that mowed plants will initially respond by re-sprouting from the base, but this preliminary research is not necessarily indicative of long-term effects associated with mowing on plant communities on the project site. Little research has been done on the effects of mowing on native desert plant species, but extensive studies have been conducted on general plant responses to short- and long-term mowing in weed research. Mowing suppresses vegetation through carbohydrate starvation, reduces its water use (which is likely to give a competitive edge to annual grasses between shrubs) and discourages reproduction by seed. Frequent mowing can stimulate branch development in some species, and eventually depletes the plants' carbohydrate reserve if done often enough (Radosevich et al. 1997). Sprouting is a common morphological response and, when repeated, results in a prostrate, turf-like structure in adapted species. Mowing every few weeks for at least one or two seasons may be all that is required to suppress perennial vegetation (Radosevich et al. 1997).

Mowing is likely to promote the proliferation of non-native invasive weeds, in particular cheat grass and red brome, two species of particular concern at the project site. These plants are of low-stature and suppressing the surrounding taller native vegetation would give these lower-growing weeds a competitive edge. The native perennial shrubs would be weakened and diminished in size, utilizing less moisture and nutrients, and increasing sunlight available to the weeds between shrubs.

In addition to the effects of mowing, mulching of mowed vegetation could change the characteristics of the soils and the plant communities in the vicinity of heliostats. Over time the addition of organic matter such as mulch in the vicinity of the heliostats would likely bring about changes to the composition of the soil (soil texture and chemistry), resulting in a decrease in native species adapted to sandy soils and favoring non-native species better suited to loamy soils.

Vegetation that is not directly impacted by clearing or pruning would be indirectly impacted by shading. Shading from heliostats would reduce the amount of sunlight available for photosynthesis, eliminating longer wavelengths of the visible light spectrum. This would likely have the most dramatic affect on crassulacean acid

metabolism (CAM) plants, desert-adapted plants like Mohave yucca, barrel cactus, and cholla. Pollinators that have a mutualistic relationship with CAM plants, like yucca and yucca moths, would also be affected. Habitat fragmentation would also adversely affect pollinator activity and therefore potentially affect gene flow among the plants that remain. Shading would reduce transpiration due to reduced in photosynthetic rates, increasing soil moisture, and resulting in changes to soil nutrient availability and microbial communities.

Construction and operation of the ISEGS project would substantially change the structure and species composition of the plant communities over the project lifetime. Conditions at the site would favor more disturbance-tolerant and shade-tolerant species, and the site would be vulnerable to invasion by non-native plants such as cheat grass and red brome. Shrubs and cacti that are frequently mowed, shaded, or subject to increased levels of water would eventually die and be replaced by short-lived species like cheesebush, rabbitbrush, and invasive weeds.

Additional Energy Commission Impact Analysis

In addition to the evaluation of impacts under NEPA, the analysis of biological impacts of the proposed project in the DEIS included an evaluation of impacts to species considered sensitive under CEQA by the Energy Commission, including plant species listed by the CNPS. For these species, the Energy Commission staff proposed Conditions of Certification to reduce the identified impacts, and these conditions are include as mitigation measures BIO-18. Implementation of these conditions on public lands would require BLM consent.

The following impact assessment and Conditions of Certification represent the analysis and conclusions of Energy Commission staff, not those of BLM staff. The Energy Commission staff concluded that construction of the ISEGS project would directly impact eight CNPS plant species, and that impacts to five of these — Mojave milkweed, desert pincushion, nine-awned pappus grass, Parish's club-cholla, and Rusby's desert-mallow — would be considered significant under CEQA guidelines. The Energy Commission staff considers project impacts to three of the eight special-status —small-flowered androstephium, Utah vine milkweed, and desert portulaca—to be less than significant. In the case of small-flowered androstephium, many new occurrences[10] of this species have been found recently, and it has a larger total number of documented occurrences. Utah vine milkweed, Utah mortonia, and desert portulaca are ranked as "watch list" by CNPS and CDFG's CNDDB and as generally considered more regionally common than plants on higher priority lists.

[10] An occurrence is defined by CDFG's CNDDB as individuals of a particular species occurring within one-quarter mile of each other. The Energy Commission staff discusses the status of the special-status plants found within the project footprint in terms of occurrences rather than numbers of individual plants. Due to incomplete data, contributors to the CNDDB sometimes do not note the number of individuals when reporting CNDDB occurrences and herbaria records, and the occurrence size in terms of individual plants cannot be ascertained.

The Energy Commission staff's conclusion of CEQA significance was based on an analysis of impacts to Mojave milkweed, desert pincushion, nine-awned pappus grass, Parish's club-cholla, and Rusby's desert-mallow in light of the following variables:

- Proportion of occurrences that may be lost and indirectly affected by the project relative to the documented occurrences and distribution of these species in California;
- Occurrence size;
- Habitat quality;
- Cumulative effects and indirect threats to remaining occurrences; and
- Peripheral population status.

Proportion of Occurrences Affected and Occurrence Size

A substantial portion of the Ivanpah Valley documented occurrences of Mojave milkweed, desert pincushion, nine-awned pappus grass, Parish's club-cholla, and Rusby's desert-mallow would be directly, indirectly, and cumulatively impacted by the project. Plants and other sessile organisms are particularly vulnerable to the effects of habitat fragmentation; small fragments of habitat can only support small populations and are more vulnerable to extinction. Even minor fluctuations in climate can be catastrophic in a small fragmented population. For Mojave milkweed, desert pincushion, nine-awned pappus grass, and Parish's club-cholla, the California populations are already geographically marginal relative to their core populations outside the state. For most of these species, these Ivanpah Valley populations represent a substantial portion of their total documented range regionally and within California. Loss of a substantial portion of these populations makes them more vulnerable to extirpation within the state, especially for Mojave milkweed; its California distribution outside of the Ivanpah Valley is restricted to only two other observations and a handful of historic herbarium collections. **Figures 4.3-1A** and **4.3-1B** illustrate the restricted range of these species. **Appendix B - Biological Resources** summarizes the percentage of statewide documented occurrences for special-status plant species in the ISEGS project area for which impacts are considered significant by Energy Commission staff under CEQA guidelines.

Rusby's desert-mallow is a highly restricted endemic, found only in California, with a range sufficiently small and represented by so few occurrences that the ISEGS impact in the Ivanpah Valley is considered significant by the Energy Commission staff, as that term is defined by CEQA. Its total documented global distribution is currently limited to fewer than 30 small occurrences in the Panamint, Clark, and Kingston ranges, including those in the project area (CNDDB 2009). Within its range, Rusby's desert-mallow is restricted to gravelly slopes and sandy washes, typically on carbonate and limestone substrates. **Figures 4.3-1** and **4.3-1B** illustrate the restricted range of these species, and their relatively few populations, making them especially vulnerable to extirpation from the state.

A substantial portion of the documented occurrences for the five species of concern (Mojave milkweed, desert pincushion, nine-awned pappus grass, Parish's club-cholla, and Rusby's desert-mallow) is attributed to the project area. Of the remaining

documented occurrences, many are threatened by livestock grazing, transmission line and access road maintenance, and non-native plants (CNDDB 2009). All of these species have a highly restricted range in California, and all are known from fewer than 30 documented occurrences (including those found in the project area). Numerous new occurrences of small-flowered androstephium (also a CNPS List 2 species) have been found in recent years during surveys conducted for other recent development projects. For this reason (combined with a larger total number of documented occurrences), the Energy Commission staff did not consider the project effects to this species to be significant in a CEQA context.

The Energy Commission staff concluded that adequate information on spring-blooming special-status plants is available to assess the proportion of special-status plant occurrences lost and indirectly affected by the project relative to the total number of documented occurrences in California. However, some summer blooming special-status plants may have been missed by the applicant's surveys (CNPS 2009, Andre 2009, Sanders 2009) and this concern has been addressed in the Energy Commission's Condition of Certification **BIO-18**.

The Energy Commission staff notes that the habitat in the project area that supports the special-status species is of particularly high quality in terms of species richness and diversity, including rich cactus and succulent diversity, creosote rings, micro-topographic diversity (upon which several of the special-status species depend), and currently contains relatively few nonnative plants. Additionally, the project occurrences for some of the affected species (such as the nine-awned pappus grass) are robust in number, relative to the smaller (and potentially less viable or defensible) populations outside of the project area.

Threats

Threats to remaining CNDDB occurrences outside the project area include grazing, transmission projects, ORV use, and non-native plants (CNDDB 2009). Some species have occurrences in the Mojave National Preserve that are not subject to these threats. While the project area contains several power lines and access roads, there appears to have been no vegetation maintenance, very little cross-country ORV damage, and what little grazing has occurred has apparently not noticeably degraded special-status plant habitat quality.

Compounding the overall threats to remaining populations are the cumulative effects of present and reasonably anticipated future energy projects and infrastructure development. In addition to the direct reduction and fragmentation of the Ivanpah Valley populations of these species described above, the project contributes to the cumulative, interactive, and synergistic impacts of multiple indirect threats, including the potential spread of non-native plants and an increased risk of fire. The recent push for renewable energy development on private and public lands in the Mojave Desert region has put many of its special-status plants under far more immediate threat of local extinctions. Accordingly, significant impacts to special-status plant species, particularly Mojave milkweed, could contribute to an increased need for state listing if not adequately mitigated. More detailed evaluation of cumulative impacts to these plant species is presented in Section 5.

Table 4.3-3
Summary of Impacts/Mitigation

Biological Resource	Impact/Mitigation
Mojave Desert Plant Communities & Wildlife Habitat	**Impacts:** Permanent loss of 4,073+ acres of Mojave creosote scrub and other native plant communities, including approximately 6,400 barrel cacti; permanent loss of cover, foraging, breeding habitat for wildlife; habitat fragmentation and loss of connectivity for terrestrial wildlife; disturbance/dust to nearby vegetation and wildlife; increased predation due to increased raven/predator presence; spread of non-native invasive weeds. **Mitigation:** Off-site habitat acquisition and enhancement of (BIO-17); implement Best Management Practices (BIO-11).
Waters of the State	**Impacts:** Impacts to biological functions and values of 198 acres of project area ephemeral; **Mitigation:** Acquisition and enhancement of 198 acres off-site waters (BIO-17).
Special-Status Plant Species	**Impact:** Direct, indirect, and cumulative impacts to eight special-status plant species. **Mitigation:** Avoid, protect, and minimize impacts to occurrences (BIO-18); implement weed management plan (BIO-13); implement Best Management Practices (BIO-11).
Special-Status Wildlife	
Desert tortoise Gopherus agassizii	**Impact:** Loss of 4,073+ acres of occupied habitat; translocation of an estimated minimum of 25 desert tortoise, resulting in reduced survivorship and reproduction for translocated individuals; fragmentation and loss of connectivity with surrounding habitat; increased risk from ravens and other predators; increased road kill hazard from construction and operations traffic; cumulative impacts to Ivanpah Valley population. Impact would be to a threatened species, and would likely be highly controversial. **Mitigation:** Off-site habitat acquisition, endowment, and enhancement of suitable desert tortoise habitat (BIO-17); conduct desert tortoise clearance surveys and establish exclusionary fencing (BIO-8); develop and implement desert tortoise translocation plan (BIO-9); implement avoidance measures and Best Management Practices (BIO-11); implement raven and weed management plant (BIO-12 and BIO-13).
Banded Gila monster Heloderma suspectum cinctum	**Impact:** Presence in project area unconfirmed; if present, potential for direct impacts, habitat loss; **Mitigation:** Compensatory mitigation for desert tortoise may also offset impacts to Gila monsters (BIO-17); implement Best Management Practices to avoid direct impacts (BIO-11).
Burrowing owl Athene cunicularia	**Impact:** Potential loss of nest, eggs, or young; loss of breeding and foraging habitat; disturbance of nesting activities; **Mitigation:** Implement burrowing owl impact avoidance and mitigation measures (BIO 16); off-site habitat acquisition and enhancement (BIO-17)
Golden eagle Aquila chrysaetos	**Impact:** Loss of foraging habitat. **Mitigation:** Off-site habitat acquisition and enhancement (BIO-17); implement Best Management Practices (BIO-11)

Biological Resource	Impact/Mitigation
Loggerhead shrike Lanius ludovicianus	**Impact:** Potential loss of nest, eggs, or young; loss of breeding and foraging habitat; disturbance of nesting activities. **Mitigation:** Conduct pre-construction nesting surveys, implement avoidance measures (BIO-15); off-site habitat acquisition and enhancement (BIO-17)
Brewer's sparrow Spizella breweri	**Impact:** Potential loss of nest, eggs, or young; loss of breeding and foraging habitat; disturbance of nesting activities. **Mitigation:** Conduct pre-construction nesting surveys, implement avoidance measures (BIO-15); off-site habitat acquisition and enhancement (BIO-17)
Crissal thrasher Toxostoma crissale	**Impact:** Potential loss of nest, eggs, or young; loss of breeding and foraging habitat; disturbance of nesting activities. **Mitigation:** Conduct pre-construction nesting surveys, implement avoidance measures (BIO-15); off-site habitat acquisition and enhancement (BIO-17)
Le Conte's thrasher Toxostoma lecontei	**Impact:** Potential loss of nest, eggs, or young; loss of breeding and foraging habitat; disturbance of nesting activities. **Mitigation:** Conduct pre-construction nesting surveys, implement avoidance measures (BIO-15); off-site habitat acquisition and enhancement (BIO-17)
Nelson's bighorn sheep Ovis canadensis nelsoni	**Impact:** Potential loss of seasonal foraging habitat and impacts to movement corridors; **Mitigation:** Implement avoidance measures and Best Management Practices (BIO-11); develop water source for bighorn in the eastern part of the Clark Mountain range or in the State Line Hills (BIO-19).
American badger Taxidea taxus	**Impact:** Loss and fragmentation of habitat, loss of foraging grounds, crushing or entombing of animals during construction **Mitigation:** Conduct pre-construction surveys and implement avoidance measures (BIO-11); off-site habitat acquisition and enhancement (BIO-17)
CNPS and Special-Status Plants	
Mojave milkweed Asclepias nyctaginifolia	**Impact:** Potential direct or indirect impacts to 16 occurrences. **Mitigation:** Implement weed management plan (BIO-13); Best Management Practices (BIO-11); special-status plant avoidance and minimization measures (BIO-18).
Desert pincushion Coryphantha chlorantha	**Impact:** Potential direct or indirect impacts 8 occurrences. **Mitigation:** Implement weed management plan (BIO-13); Best Management Practices (BIO-11); special-status plant avoidance and minimization measures (BIO-18).
Nine-awned pappus grass Enneapogon desvauxii	**Impact:** Potential direct or indirect impacts to 3 occurrences. **Mitigation:** Implement weed management plan (BIO-13); Best Management Practices (BIO-11); special-status plant avoidance and minimization measures (BIO-18).

Biological Resource	Impact/Mitigation
Parish's club-cholla Grusonia parishii	**Impact:** Potential direct or indirect impacts to 5 occurrences. **Mitigation:** Implement weed management plan (BIO-13); Best Management Practices (BIO-11); special-status plant avoidance and minimization measures (BIO-18).
Rusby's desert-mallow Sphaeralcea rusbyi var. eremicola	**Impacts:** Potential direct or indirect impacts to 7 occurrences. **Mitigation:** Implement weed management plan (BIO-13); Best Management Practices (BIO-11); special-status plant avoidance and minimization measures (BIO-18).

Indirect Effects

The Energy Commission staff's analysis was based on limited information to assess indirect impacts to special-status plants adjacent to the project boundary because there are no survey data available for this area. Floristic surveys were originally conducted in 2007 to cover the 250-foot buffer zone outside the project footprint, but in 2008 the applicant proposed substantial changes to the ISEGS project and expanded the project into this 250-foot buffer zone. Given the distribution of special-status plants within the project footprint and adjacent habitat characteristics the Energy Commission staff assumed that these same species are likely to occur within the buffer zone, although the specific location and number of these plants is unknown. The discussion below is therefore a conceptual overview of potential indirect impacts to special-status plants.

Indirect effects to special-status plants outside the project boundary include erosion/sedimentation of plants or their seed bank (particularly downslope any disturbed soils); the spread of noxious weeds from the solar fields into the surrounding habitat; changes in the hydrology from alterations in the drainage patterns of the site (several special-status plant species are associated with desert washes); greater than normal dust levels, the effects of herbicide drift on special-status plants and their pollinators; and an increased risk of fire. Even activities as seemingly harmless as dumping or spreading clippings from mowing areas infested by weeds is likely to result in the inadvertent introduction and spread of invasive plants into rare plant populations.

These indirect impacts could extend beyond the immediate vicinity of the project area. Disturbance of the soil's surface caused by construction traffic and other activities would result in increased wind erosion of the soil. Aeolian (wind-borne) transport of dust and sand can result in the degradation of soil and vegetation over a wide area (Okin et al. 2001). Aeolian transport and dust, sand, and litter are the primary mechanisms of degradation, killing plants by burial and abrasion, interrupting natural processes of nutrient accumulation, and allowing the loss of soil resources.

Non-native forms may be introduced or existing weeds spread due to construction and operation of ISEGS. Many invasive non-native species are adapted to and promoted by soil disturbance, and seeds are commonly transported on vehicles and by wind and water. Exotics can out-compete native species because of minimal water requirements, high germination potential and high seed production (Beatley 1966) and can become locally dominant, representing a serious threat to native desert ecosystems (Abella et al. 2008). The ISEGS project could adversely affect special-status plant occurrences near

the project area by the increase and spread of non-native plant species. Soil disturbance from construction activity often renders habitat vulnerable to invasion by non-native species (Lathrop & Archibald 1980). Construction activities have the potential to indirectly affect botanical resources through the spread of weeds already present in the construction footprint to currently un-infested areas, and by the accidental introduction of new weed species from contaminated equipment and straw (used for erosion control). The spread of invasive plants is a major threat to biological resources in the Mojave Desert because non-native plants can displace native plants (and the wildlife that depend on them), increase the threat of wildfire (particularly cheat grass), alter the habitat structure and ecological function of wetland, riparian, and desert wash communities, and invade threaten special-status plant occurrences and habitat.

Implementation of Conditions of Certification **BIO-11** (Impact Avoidance and Best Management Practices) and **BIO-13** (Weed Management Plan) could potentially avoid, minimize and compensate for these indirect impacts to special-status plant species on/near the ISEGS site. Condition of Certification **BIO-18** requires pre-construction surveys within the 250-foot buffer beyond the project fenceline, and requires monitoring and protection measures for protected special-status plant populations to minimize indirect impacts.

Energy Commission Staff Conclusions Regarding CNPS and Special-Status Plants

Uncertainty remains as to what level of avoidance could be achieved to protect special-status plants. The applicant stated at the July 31, 2009 Energy Commission workshop that they cannot yet commit to specific avoidance areas because site-specific heliostat layouts have not yet been developed. During that workshop the applicant also indicated a willingness to work with the Energy Commission staff to discuss specific avoidance areas and reduce impacts to the extent feasible. As a result of workshops in early 2010, the applicant proposed a Biological Mitigation Proposal on February 11, 2010. That proposal is the basis for the Mitigated Ivanpah 3 Alternative evaluated in this FEIS.

Given the uncertainties as to extent of special-status plant protection that might be feasible, Energy Commission staff concluded that implementation of Condition of Certification **BIO-18** would reduce impacts to desert pincushion, nine-awned pappus grass, and Parish's club-cholla to less-than-significant levels if the protection goals described above were achieved. The impacts to Mojave milkweed cannot be sufficiently reduced by avoidance in the three areas described above because it is so widely distributed throughout the site. The impacts to Rusby's desert-mallow would also remain significant in a CEQA context because construction would still eliminate a substantial portion of its global population even if the majority of individuals are protected on site.

The Energy Commission staff also anticipated that the use of polymer-based chemicals for fugitive dust control would require product selection and application methods that would not adversely impact these sensitive plant species within the avoidance areas or impact site vegetation overall. Energy Commission staff believes it is impractical to use water for dust control after site grading is completed over such a broad area, considering the rapid evaporation rate in the desert environment and limitations in water supply. Therefore, mitigation measures **AQ-SC3 and AQ-SC-7** and **Soil and Water-1**

would require selection and application of chemical dust suppressants that would not adversely affect vegetation.

The Energy Commission staff considers the direct and indirect impacts to native plant communities from construction and operation of the ISEGS project to be significant under the CEQA criteria used in their environmental evaluation process. Mitigation measure **BIO-13**, the Weed Management Plan, would help prevent the spread of non-native and invasive plant species on the ISEGS site.

Mitigation measures **BIO-14 and BIO-27**, the Closure, Revegetation and Rehabilitation Plan, provide guidelines for minimizing impacts to project area plant communities, and for revegetating project area plant communities affected by construction.

Closure/Decommissioning Impacts

Closure and decommissioning of the facility would result in the revegetation and rehabilitation of 3,713 acres[11] of land associated with the project. Direct and indirect impacts to biological resources from closure/decommissioning activities would be similar to those described for construction impacts. While the objective of the reclamation would be to re-establish much of the native habitat that currently exists on-site, while minimizing the amount of noxious and invasive weeds, reestablishment of desert vegetative communities would take decades and may differ in composition than the pre-disturbance vegetative community. Noxious and invasive weeds would likely be more prevalent than existing conditions. Permanent changes in the vegetative communities would alter the ecosystem's ability to sustain the same type and numbers of species currently found at the site.

The applicant submitted their first draft of a Closure, Revegetation, and Rehabilitation Plan (Plan) in August 2008 (CH2M Hill 2008m). Since submittal of the plan, BLM has continued to work with the applicant to develop specific details, especially with respect to the numbers and types of plants to be salvaged, and the means of transplanting and managing the plants during the operational period. The most current version of the plan, Revision 3, was submitted on July 6, 2010 (CH2M Hill 2010). The plan describes procedures and practices for salvage and storage of succulents (cacti and yuccas) and revegetation of sites temporarily affected during construction. The plan also includes conceptual guidance for revegetation and rehabilitation efforts after closure and decommissioning at the end of the 50-year life of the project, or earlier in the event of an unplanned closure. **Appendix B - Biological Resources** identifies the specific requirements to be met by the plan, as described in mitigation measures **BIO-14 and BIO-27**.

Beneficial Impacts

The proposed project would not provide any beneficial impacts to native plant communities.

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[11] Although the surface disturbance for the project is 4,073 acres, this value includes 321 acres of temporary surface disturbance. Consequently, the total acres for operation and those requiring revegetation during closure is 3,713 acres.

4.3.2.1.2 Impacts to Special Status Plants

Construction Impacts

Impacts to Rusby's desert mallow would be comparable to those previously described for plant communities. However, the impacts from construction have a greater potential to cause population level impacts than for other species. Surface disturbance-related activities may result in the loss of individuals from construction vehicles and equipment passing over an area. Compaction, soil erosion, and loss of cryptobiotic crusts may reduce revegetation potential. Indirect impacts may include the introduction or spread of noxious weeds and invasive plant species. Noxious weed control through use of biological, mechanical, chemical, or various alternative methods may also indirectly impact special status species individuals and may alter potentially suitable habitat through changes in vegetation community cover and composition.

Within the project footprint, there are 15 individual Rusby's desert mallow plants at 12 locations. Locations of these species that would be impacted would be avoided to extent practicable. Prior to construction, those specified plant locations that could not be avoided would be salvaged and relocated to the 7-acre Rare Plant Transplantation Area. The Rare Plant Transplantation Area would only be used for salvaged plant species of concern (i.e., special status and CNPS species) to reduce the amount of disturbance to salvaged plants should pre-construction surveys determine that remedial measures be needed. The 59-acre Succulent Nursery Area would be used for salvaged cacti and yucca species. Pending further consultation and BLM and Energy Commission staff review and concurrence, additional construction-related mitigation may be required.

While surveys were conducted for sensitive plant species (i.e., CNPS and special status species), these surveys only were conducted in the spring. As a result, late summer and fall blooming species could have been undetected. Federal and state agencies shall identify those species with potential for occurrence within the project area based on the current distribution of the species, habitat association, and relative occurrences within the project area. Mitigation measure **BIO-21** requires that further field surveys be conducted during the appropriate season and within suitable habitat in the project area following survey protocols appropriate for the species' of interest. If special status species occurrences are identified, preferred mitigation would consist of avoidance, whenever practical.

Operational Impacts

To the maximum extent practical, plant species of concern located within the heliostat fields would be avoided and protected during construction through the use of fencing to avoid inadvertent encroachment. Fencing would be removed following construction and an alternative marking material (e.g., posts or stakes) would be installed to indicate the areas where avoided plants are located.

Closure/Decommissioning Impacts

Impacts associated with closure and decommissioning of project facilities on special status plant species would be comparable to those previously described for plant

communities. Permanent changes in the vegetative communities likely would alter the ecosystem's ability to sustain the same type and density of special status plant species currently found at the site.

Beneficial Impacts

The proposed project would not provide any beneficial impacts to special status plant species.

4.3.2.1.3 Impacts to Wildlife

Construction Impacts

Vegetation clearing and grading of 4,073 acres of land associated with project construction would directly affect wildlife by removal and crushing of shrubs and herbaceous vegetation, resulting in loss and fragmentation of cover, breeding and foraging habitat. Soil erosion from construction activities and vehicle activity, which affects vegetation and soil properties, could have an adverse effect on wildlife foraging and burrowing potential to lands outside of the ISEGS boundaries. Construction and operation of ISEGS could also result in wildlife/vehicle collisions, burial in dens or burrows, and colliding with vehicles and power line conductors or towers. In addition, some wildlife species could experience increased predation levels from ravens and other predators attracted to the project site. Increased levels of noise and human activity would be detrimental to many wildlife species, particularly big game.

Insects, reptiles, and small mammals that utilize the existing habitats within the project area would be affected directly and indirectly by the construction of the project. Construction activities, such as clearing and grading would result in the direct injury and mortality of some individuals, particularly to less mobile, terrestrial species. If construction occurs during the breeding season, direct impacts to burrowing or nesting wildlife species includes nest or burrow abandonment and loss of eggs or young.

Indirect effects would occur due to the temporary loss of habitat and increased fragmentation until vegetation is reestablished. For species with relatively small home ranges (e.g., lizards), the loss of habitat may cause localized population reductions. Indirect impacts would result from increased noise levels and human presence during surface disturbance activities resulting in the displacement of wildlife species. Additional indirect impacts include increased presence of noxious and invasive weeds resulting in reduced forage and habitat quality, and dust effects from unpaved roads. These indirect effects can increase stress within individuals resulting in greater susceptibility to disease and lower fecundity.

Noise from construction activities could temporarily discourage wildlife from foraging and nesting immediately adjacent to the project area. Many bird species rely on vocalization during the breeding season to attract a mate within their territory. Noise levels from certain construction, operations, and demolition activities could reduce the reproductive success of nesting birds. The expected loudest composite noise levels are approximately 89 dBA at 50 feet from the activity, which results in noise levels of approximately 77 and 61 dBA at distances of 200 and 400 feet from the activity, respectively (CH2M Hill 2007). The construction period is relatively short, about 20

months per phase, and wildlife usually becomes habituated to ongoing general construction noise. Weisenberger et al. (1996) found that bighorn sheep responded to aircraft overflights with increased heart rates and altered behavior; however, animal response decreased with increased exposure. In general, nearly all equipment would be specified to have near-field maximum noise levels that do not exceed 90 dBA at 3 feet from the activity (or 85 dBA at 3 feet where available as a vendor standard) to limit the noise exposure of plant personnel to acceptable levels. As a result of these design features, the temporary nature of these activities, and the adherence to noise reducing mitigation measures, the noise levels at the project fence line are not expected to have any substantial impact on nearby wildlife resources.

MBTA and Other Bird Species

The loss of active migratory bird nests or young is regulated by the federal Migratory Bird Treaty Act and Fish and Game Code section 3503. The MBTA provides that it is unlawful to "*pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatsoever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention . . . for the protection of migratory birds . . . or any part, nest, or egg of any such bird*" (16 U.S.C. 703).

Direct and indirect impacts to bird species for construction would be similar to those impacts described above, including loss of habitat quantity and quality, potential impairment within movement corridors, mortality due to vehicle/bird collisions, and indirect impacts from construction and increased human activity levels. If surface disturbance activities occur during the breeding season for passerines, raptors, and other summer avian residents (approximately March through July), nest or territory abandonment or the loss of eggs or young (loss of productivity) for the breeding season could result. Impacts to nesting birds would depend on the nest location relative to the proposed disturbance area, the phase of the breeding period, and the level and duration of the disturbance.

Mitigation measure **BIO-22** would require that the applicant prepare a MBTA Conservation Agreement in coordination with the USFWS, BLM, and CFGD. This agreement would identify procedures to minimize or eliminate impacts to MBTA species. Procedures may include, but are not limited to, pre-construction clearing and grading outside of breeding seasons, enforceable timing restrictions and identification of permissible activities within a prescribed distance from active nests, survey protocols for raptors and MBTA species, buffer zones around active nests, monitoring and reporting requirements. The MBTA Conservation Agreement may also require monetary compensation or land acquisition.

The applicant has proposed mitigation measures to avoid and minimize impacts to nesting birds that have been incorporated into mitigation measures **BIO-11** (Impact Avoidance and Best Management Practices), **BIO-15** (Pre-construction Nest Surveys) and **BIO-16** (Burrowing Owl Avoidance and Impact Minimization Measures). Implementation of these mitigation measures would avoid direct impacts to nests, eggs,

or young of migratory birds, and would minimize the impacts of construction disturbance to nesting birds.

Operations Impacts

The project area generally supports high quality, native Mojave Desert vegetation that supports a diverse wildlife community. Operation of the project would result in the permanent loss of 3,713 acres of wildlife habitat. Operational impacts to wildlife broadly include declining quality and quantity of forage due to loss of habitat, increased dust, fewer native plants, and proliferation of noxious weeds; increased road traffic resulting in animal/vehicle collisions; noise and increased human activity that increases stress on wildlife, potentially lowering resistance to disease; encroachment on movement corridors, resulting in hampering or restricting movements between seasonal ranges and/or water sources; habitat fragmentation, resulting in increased genetic isolation of some species; and displacement of species from existing habitats. Although habitats adjacent to the project may support some displaced animals, species that are at or near carrying capacity could suffer some increased mortality rates due to displacement.

Operational noise, anticipated to be less than 30 dBA, would be more consistent and at a much lower level than during construction. The power plant would operate an average of about 10 hours a day, 7 days a week throughout the year, with the exception of a scheduled shutdown in late December for maintenance (CH2M Hill 2007). The solar field and power generation equipment would be started up each morning after sunrise and insolation build-up, and shut down in the evening when insolation drops below the level required for generating power. In addition, the solar nature of the facility limits its primary operations and noise generating activities to the daylight hours when ambient levels (such as from I-15, which is located 0.8 mile southeast of proposed Ivanpah 1) are typically highest. Therefore, with the implementation of applicant-proposed noise-reducing measures described in the AFC (CH2M Hill 2007), the impact on operational noise on surrounding wildlife is expected to be minimal. These measures include requiring construction equipment to maintain maximum noise levels at 90 dBA or less three feet from the construction activity.

Potential operation impacts include impacts to birds, bats, and flying insects due to collision with structures, risk of heat-related injuries attributable to the reflected and focused beams of solar radiation between the heliostats and the power towers, and effects of disturbance and lighting.

Birds and bats are known to collide with communications towers, transmission lines, and other elevated structures. The ISEGS project design would result in the construction of 5 power towers 459 feet in height, and 3 boiler stacks 131 feet in height. Numerous other project-related structures lower in height would also be constructed. The heliostat array at Ivanpah 1 and 2 would be arranged around a single centralized solar power tower, and for Ivanpah 3 arranged around five power towers, each 459 feet high. These towers would include FAA-required lighting and a lightening pole that would extend above the top of the towers approximately 5 to 10 feet.

Diurnal birds could collide with tall structures, and could also be at risk of injury and fatality from burns if they flew into the reflected sunlight between the heliostats and the

power towers. Although data are limited, one 79-acre solar facility with one 282-foot tall solar tower experienced 1.7 avian mortalities per week (McCrary 1986). The majority of avian mortalities were attributed to collisions, but approximately 20 percent were attributed to heat related injuries. Although proposed ISEGS project is approximately 50 times the size of the McCrary study site with more numerous and taller towers, the collisions mortalities and heat-induced injuries that have been reported at solar facilities, may be associated or exacerbated by large evaporation ponds at the solar plant that attracted the birds to the area (McCrary 1986) and collisions with guy wires in poor visibility conditions such as fog or inclement weather (Manville 2001). Because the ISEGS project does not include evaporation ponds or guyed structures and rarely is subject to weather that reduces visibility, collision and heat-related injuries may not be substantial. Nevertheless, there is insufficient data to make definitive conclusions regarding the potential magnitude of these types of impacts at the ISEGS facility.

Mitigation measure **BIO-23** would require the applicant to conduct visual biweekly surveys for bird and bat mortalities throughout the project site. Data would document the species affected and any overt signs of injury resulting in death (e.g., scorched feathers). This information would be compiled and provided to the BLM on quarterly intervals for the first three years, then annually thereafter, unless otherwise requested by the BLM. This data would add to the understanding of impacts of solar facilities on avian and bat species. BLM would maintain the authority to require additional mitigation of the applicant in the future to reduce collision or heat-related injuries.

Artificial lighting associated with the facilities on wildlife species may include disorientation from and attraction to artificial light, impact-related mortality due to disorientation, and effects on the light-sensitive cycles of many species (Saleh 2007). Lighting plays a substantial role in collision risk because lights attract nocturnal migrant songbirds, bats, and flying insects, and major bird kill events have been reported at lighted communications towers (Manville 2001) with most kills from towers higher than 300 feet (Kerlinger 2004). Many of the avian fatalities at communications towers and other tall structures have been associated with steady-burning, red incandescent L-810 lights used at communications towers (Gehring et al. 2006). Longcore et al. (2008) concluded that use of strobe or flashing lights on towers resulted in less bird aggregation, and, by extension, lower bird mortality, than use of steady-burning lights. Bright night-lighting close to the ground at the ISEGS project site could also attract bats and flying insects and disturb wildlife that occurs adjacent to the project site (e.g., nesting birds, foraging mammals).

To minimize this risk of collision and disturbance to birds and other wildlife from lights, implementation of mitigation measure **BIO-11** is proposed to establish a specification that the lighting atop the towers use flashing strobes rather than steady burning lights, and downward shielded lighting that is turned off when not needed.

Large raptors like golden eagles can be electrocuted by transmission lines when a bird's wings simultaneously contact two conductors of different phases, or a conductor and a ground. This happens most frequently when a bird attempts to perch on a structure with insufficient clearance between these elements. To minimize risk of electrocution, the applicant has proposed a "raptor-friendly" construction design for the transmission line with conductor wire spacing greater than the wingspans of large birds to help prevent

electrocution as described in Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006 (APLIC 2006). BLM will not approve a transmission line that is not raptor-safe. With mitigation measure **BIO-11**, the proposed transmission lines would not pose a substantial threat to birds.

Loss of habitat and other impacts associated with the project could adversely affect local populations of invertebrates, insects, reptiles, birds, and small mammals that have small home ranges within the Ivanpah Valley. However, the project is not expected to cause population effects of common wildlife species at the regional level. For common wildlife with larger home ranges, population level affects are not anticipated because the project area represents a small fraction of the available habitat within the region. Impacts would be reduced with avoidance and minimization measures described in mitigation measures **BIO-1** through **BIO-7**.

<u>Closure/Decommissioning Impacts</u>

Removal of facilities initially would have similar impacts to those described for construction. Closure and decommissioning of the facility would result in the revegetation and rehabilitation of 3,713 acres of land in accordance with the Closure, Revegetation, and Rehabilitation Plan, as required in mitigation measures **BIO-14 and BIO-27**. Because reestablishment of desert vegetative communities would take decades and may differ in composition than the pre-disturbance vegetative community, these permanent changes in the vegetative communities would alter the ecosystem's ability to sustain the same type and numbers of wildlife species currently found at the site.

The ability of wildlife species to eventually recolonize the reclaimed area would depend on the proximity of other populations, connectivity of habitats, and the mobility of the species. Terrestrial species with small home ranges will not colonize as quickly (if at all, compared to flying organisms or wildlife with large home ranges. The degree of habitat fragmentation will affect wildlife species ability to recolonize the reclaimed area.

<u>Beneficial Impacts</u>

The proposed project would not provide any beneficial impacts to wildlife.

4.3.2.1.4 Impacts to Special Status Wildlife Species

<u>Reptiles</u>

Banded Gila Monster (Heloderma suspectum cinctum)

Construction Impacts

Gila monsters were not detected during the 2007/2008 surveys, but this species is difficult to detect and cannot be assumed to be absent based on the absence of observations. If Gila monsters are present in the ISEGS project area they may be harmed during clearing, grading and trenching activities or may become entrapped within open trenches and pipes. Construction activities could also result in direct mortality, injury, or harassment of individuals as a result of encounters with vehicles or heavy equipment. While relocation of banded Gila monster may temporarily remove the

lizard from the construction area, this species shows high fidelity to its original site. Tortoise fencing may provide exclusion protection, though that has not been documented. Mitigation measure **BIO-11** requires that concurrent with the desert tortoise clearance survey, a biologist perform a preconstruction survey for Gila monsters in the project area, and implement appropriate impact avoidance and minimization measures if detected.

Construction of the ISEGS project would disturb 4,073 acres that might provide cover, foraging, and breeding habitat for banded Gila monsters. Mitigation measure **BIO-17**, the compensatory mitigation plan, could offset the loss of habitat for this species.

Operational Impacts

Operational impacts would be comparable to those experienced by other reptiles within the project area as described above for wildlife resources. If present within the project area, adverse impacts to individual(s) are probable.

Closure/Decommissioning Impacts

Removal of facilities initially would have similar impacts to those described for construction. Reclamation following closure and decommissioning may take decades. Because reestablishment of desert vegetative communities would take decades and may differ in composition than the pre-disturbance vegetative community, these permanent changes in the vegetative communities would alter the ecosystem's ability to sustain the same numbers of banded Gila monster that potentially currently occur at the site. Given the solitary and secretive habits of the banded Gila monster, impacts to individuals and the ability of any nearby populations to recolonize the site in the future is speculative.

Based on the low probability of occurrence within the site, the proposed project would not likely adversely affect banded Gila monster.

Beneficial Impacts

The proposed project would not provide any beneficial impacts to banded Gila monster.

Desert Tortoise (Gopherus agassizii)

Construction Impacts

The 2007/2008 protocol desert tortoise surveys found 25 live desert tortoises, 97 desert tortoise carcasses, 214 burrows, and 50 other tortoise sign (CH2M Hill 2007). Tortoise sign and density was greatest in Ivanpah 1 at the southern boundary of the project site and was less dense as the survey moved towards the Clark Mountains and Ivanpah 3. Desert tortoises also occur along the ISEGS linear facilities (CH2M Hill 2007). Using USFWS survey data for the Northeastern Mojave Tortoise Recovery Unit in the North Ivanpah Valley (USFWS 2009), some estimates suggest that up to 50 tortoises may reside in the project area.

During construction of the ISEGS project desert tortoises may be harmed during clearing, grading, and trenching activities or may become entrapped within open trenches and pipes. Construction activities could also result in direct mortality, injury, or

harassment of individuals as a result of encounters with vehicles or heavy equipment (see Operational Impacts below). Other construction effects could include individual tortoises being crushed or buried within their burrows, collection or vandalism, disruption of tortoise behavior during construction or operation of facilities, disturbance by noise or vibrations from the heavy equipment, and injury or mortality from encounters with workers' or visitors' pets. Desert tortoises may also be attracted to the construction area by application of water to control dust, placing them at higher risk of injury or mortality. Increased human activity and vehicle travel would occur from the construction and improvement of access roads, which could disturb, injure, or kill individual tortoises. Also, tortoises may take shelter under parked vehicles and be killed, injured, or harassed when the vehicle is moved.

The applicant has recommended impact avoidance and minimization measures to reduce these direct impacts to desert tortoise, including installation of exclusion fencing to keep desert tortoise out of construction areas, relocating/ translocating the resident desert tortoise from the ISEGS site, reducing construction traffic and speed limits to reduce the incidence of road kills and worker training programs.

These recommendations are incorporated into the mitigation measures. These include mitigation measures **BIO-1** through **BIO-6**, which apply to protection of desert tortoise and other biological resources in and near the ISEGS project area, and mitigation measures **BIO-8** through **11**, which are specific to desert tortoise.

Mitigation measure **BIO-8** would involve installation of security and desert tortoise exclusionary fencing around the entire project site and along access roads, and **BIO-9** requires the development and implementation of a desert tortoise translocation plan to move the tortoises currently living in the ISEGS project area to the identified translocation sites. Mitigation measure **BIO-10** requires verification that all desert tortoise impact avoidance, minimization, and compensation measures have been implemented. Mitigation measure **BIO-11** requires a variety of additional impact avoidance and minimization measures to reduce the risk of injury and death to desert tortoise as well as other sensitive species.

Implementation of mitigation measures **BIO-8** and **BIO-9** have inherent risks and could themselves result in direct effects such as mortality, injury, or harassment of desert tortoises due to equipment operation, fence installation activities, removal of tortoise burrows, and tortoise translocation. Installation of exclusionary fencing at the perimeter of the project area would also fragment habitat for desert tortoise and home ranges of individual tortoises.

Translocation/Relocation

Capturing, handling, and relocating desert tortoises from the proposed site after the installation of exclusion fencing could result in harassment and possibly death or injury. Tortoises may die or become injured by capture and relocation if these methods are performed improperly, particularly during extreme temperatures, or if they void their bladders. Averill-Murray (2001) determined that tortoises that voided their bladders during handling had significantly lower overall survival rates (0.81-0.88) than those that did not void (0.96). If multiple desert tortoises are handled by biologists without the use of appropriate protective measures, pathogens may be spread among the tortoises,

both resident and translocated animals. For those tortoise near but not within the ISEGS site, removal of habitat within a tortoise's home range or segregating individuals from their home range with a fence would likely result in displacement stress that could result in loss of health, exposure, increased risk of predation, increased intraspecific competition, and death. Tortoises moved outside their home ranges would likely attempt to return to the area from which they were moved, therefore making it difficult to isolate them from the potential adverse effects associated with project construction.

The risks and uncertainties of translocation to desert tortoise are well recognized in the desert tortoise scientific community. The Desert Tortoise Recovery Office (DTRO) Science Advisory Committee (SAC) has made the following observation regarding desert tortoise translocations (DTRO 2009, p. 2):

"As such, consensus (if not unanimity) exists among the SAC and other meeting participants that translocation is fraught with long-term uncertainties, notwithstanding recent research showing short-term successes, and should not be considered lightly as a management option. When considered, translocation should be part of a strategic population augmentation program, targeted toward depleted populations in areas containing "good" habitat. The SAC recognizes that quantitative measures of habitat quality relative to desert tortoise demographics or population status currently do not exist, and a specific measure of "depleted" (e.g., ratio of dead to live tortoises in surveys of the potential translocation area) was not identified. Augmentations may also be useful to increase less depleted populations if the goal is to obtain a better demographic structure for long-term population persistence. Therefore, any translocations should be accompanied by specific monitoring or research to study the effectiveness or success of the translocation relative to changes in land use, management, or environmental condition."

Given the dangers to desert tortoises associated with their translocation, the CDFG, USFWS and other parties (CBD 2009, DOW 2009, SC 2009b) have expressed their concerns about the outcome of proposed desert tortoise translocations for the ISEGS project, and have requested that those concerns be addressed in any relocation/ translocation plans approved for the ISEGS project.

To provide guidance for the applicant in addressing these concerns and developing an adequate relocation/translocation plan, on December 12, 2008 the USFWS prepared interim specific guidelines for clearance and translocation of desert tortoises from the ISEGS project site (USFWS 2008b). The applicant submitted their first Draft Desert Tortoise Relocation/Translocation Plan on March 19, 2009, identifying an area west of the ISEGS project site as a relocation area and lands southwest of the project site, adjacent to I-15, as a translocation area[12]. The Energy Commission staff, USFWS and CDFG provided comments on that submittal (CEC 2009d), requesting considerably more detail on the habitat quality and suitability of the proposed relocation and translocation sites, as well as specific details on the how the translocation would be conducted. The applicant submitted a revised Draft Desert Tortoise

[12] Translocation is required when a desert tortoise must be moved more than 500 meters to clear it from a project site, while relocation requires a movement of less than 500 meters (USFWS 2010).

Relocation/Translocation Plan on May 27, 2009 in their Supplemental Data Response Set 2D, Attachment BR5-1B, as part of their Incidental Take Permit application (CH2M Hill 2009g). In this second submittal the applicant identified the area west of the ISEGS site as both potential translocation and relocation areas.

On July 14, 2009, the Energy Commission staff, USFWS, and CDFG commented on that second relocation/ translocation plan and once again requested additional information on the habitat quality and suitability of the proposed relocation/translocation sites (CEC 2009e). In response to those comments, the applicant conducted surveys for desert tortoise in July 2009 at four potential translocation areas to the west of the Ivanpah SEGS project site (CH2M Hill 2009f). They also conducted field surveys to make a vegetation assessment of areas to the west of the Ivanpah SEGS project and to the southwest of the project, near I-15 (CH2M Hill 2009n). Because the vegetation data were collected during summer and well after the flowering period of most winter and spring annuals the focus of the study was on perennial shrubs and succulents alone.

Four live tortoises and numerous tortoise burrows and carcasses were observed during surveys at four proposed relocation/translocation areas (CH2M Hill 2009f). The applicant's consultants concluded that the density of desert tortoises in the proposed translocation area was low and translocation of animals from the ISEGS site to this area would not overburden the resident population (CH2M Hill 2009f). Based on their vegetation assessment (CH2M Hill 2009n) the applicant also asserted that the relocation areas to the west of the project area had higher shrub and succulent diversity and richness than the ISEGS site itself. Based on the desert tortoise survey result, the applicant concluded that the relocation/ translocation sites west of the project site would provide suitable habitat for desert tortoises removed from the ISEGS project area.

BLM, Energy Commission staff, and the USFWS have reviewed the applicant's desert tortoise and vegetation survey results for the proposed relocation/translocation sites, and have determined that the survey and vegetation results are satisfactory, and fulfill expectations regarding assessment of habitat quality at the relocation/translocation site west of the project area (BLM 2009a). However, due to the season of these vegetation studies, there was no measure of annuals, the main diet of tortoises, or evaluation of the soils (BLM 2009a). BLM staff requested that the applicant provide a habitat assessment based on the USGS desert tortoise habitat model (Nussear et al. 2009). That assessment showed that three of the four proposed translocations sites, as well as all three of the ISEGS units, have excellent desert tortoise habitat potential, ranking as 0.9 on a scale of 1.0 (CH2M Hill 2009o). This ranking is based on the USGS model of desert tortoise habitat potential which incorporates variables encompassing: soil (soil depth, rockiness, bulk density); landscape (surface roughness, slope, aspect, elevation); climate (winter and summer precipitation, variance of precipitation); and biotic (annual plant potential and perennial plant cover) (Nussear et al. 2009).

USFWS Staff at the Ventura field office also reviewed the applicant's submittals and considered the desert tortoise surveys and vegetation data adequate to evaluate the effects of the relocation of desert tortoises to the applicant's proposed translocation/relocation sites (USFWS 2009). The USFWS also expressed the opinion that highway fencing along I-15 was needed prior to translocation because of the potential for long-distance movements by tortoise following release (USFWS 2009).

The BLM received numerous comments from the public during the DEIS review period concerning the adequacy of the translocation plan. Concurrently, the REAT managers group, which includes senior management representatives from the BLM, CDFG, Energy Commission, and the USFWS developed additional translocation guidelines for renewable energy projects, updating the interim translocation guidelines developed by the USFWS. The wildlife agencies (USFWS and CDFG) modified disease testing protocols for tortoises, and tortoises being moved more than 500 meters (1640 feet) must be tested and assessed as free of disease before they are released into the translocation area (USFWS 2010). Additionally, the wildlife agencies recommend tortoises that would be moved more than 500 meters (e.g., outside their known range) should be translocated to suitable habitats that will be protected from further disturbance over the short and long term. Following this guidance, BLM, in consultation with USFWS and CDFG, developed a new strategy for tortoises requiring relocation and translocation from the ISEGS project area. This new strategy is as follows:

All healthy tortoises (i.e. showing no clinical signs of disease) within 500 meters of the western and northern boundary will be moved outside the project area to the west (this area incorporates three of the originally identified translocation sites) and north, respectively. These tortoises would not require disease testing, as they will be moved to areas already part of the natural range of these individuals. No tortoises would be moved to the east or south of the ISEGS project area, due to anticipated future projects, and the desire to avoid the potential of needing to relocate tortoises twice (once for ISEGS and then again associated with proposed future projects). If BrightSource finds a desert tortoise with clinical signs of disease, they would remove it from the population, contact BLM, CDFG, and USFWS immediately, and transfer it to a location agreed to by CDFG and USFWS. This would also apply to tortoises encountered along Colosseum Road. These animals would be moved out of harm's way, outside of, but immediately adjacent to, the tortoise proof fencing along this road.

Tortoises found within the CLA, Ivanpah 1, and Ivanpah 2, but greater than 500 meters from the western boundary, would be translocated to the Mojave National Preserve. Specific translocation sites will be determined in Fall 2010 and Spring 2011, but will be in this general area: south of Nipton Road, west of Ivanpah Road, north and west of Morningstar Mine Road, north of the Morning Star Mine access route, and east of the Ivanpah Mountains. Tortoises within the CLA and Ivanpah 1 will have blood drawn for disease testing and will then be moved to the Preserve's desert tortoise research center near the Nipton Road and Ivanpah Road junction in Fall of 2010. These individuals will be held in quarantine over the winter at this facility, waiting for disease test results. Tortoises within Ivanpah 2 will have blood drawn, radio transmitters attached, and will be released back into their home ranges, to remain *in-situ* over the witner, awaiting disease test results. Within Ivanpah 2, the power block and access road to the power block will be fenced to exclude tortoises, to allow for construction within this area during winter 2010-2011. Any tortoises found within this area during fall clearance surveys would be moved just outside of the fenced work area and still within their natural range (i.e., moved less than 500 meters). All tortoises within Ivanpah 2 would be moved to the Preserve in Spring 2011, upon receiving a ELISA negative test result. Any tortoises with a positive ELISA test result would be removed from the opulation and placed in a

location agreed upin by CDFG and USFWS. Any tortoises that are within 500 meters of an ELISA positive tortoise would need to be re-tested for disease in Spring 2011.

Tortoises found within Ivanpah 3, but greater than 500 meters from the northern boundary, will have blood drawn, radio transmitters attached, and will be released back into their home ranges, to remain *in situ* over the winter, awaiting disease test results. Any tortoises with a positive ELISA result would be removed from the population and place din a location agreed upon by CDFG and USFWS. Any tortoises that are within 500 meters of an ELISA positive tortoise would have blood drawn gain in the Spring and retested for disease. All ELISA negative tortoises within Ivanpah 3 would be translocated west of the project, into the identified translocation zones west of Ivanpah 3, due to the similarity of habitat. This translocation would occur in the spring prior to the construction of Ivanpah 3, planned for 2011.

Mitigation measure **BIO-9** requires development of a final Desert Tortoise Translocation Plan in consultation with BLM, Energy Commission staff, CDFG and USFWS to address outstanding concerns that these agencies have regarding the specifics of the plan. The translocation plan should incorporate a three level approach to tortoise translocation. First, any tortoise discovered along the perimeter of any of the project sites during fence building operations will be moved out of harm's way in an over-the-fence treatment. The same method would be applied to tortoise discovered during reconstruction of Colosseum Road by moving the tortoise out of harm's way. Tortoise located within the Construction Logistics Area and within the interiors of the power blocks for Ivanpah 1 and 2 would be relocated to the headstart tortoise facility inside the Mojave National Preserve. Tortoise residing in the Ivanph 3 unit tend to live in caliche soil areas and typically do not contruct burrows; rather, they use natural caverns and openings in the caliche soil formations as burrows. Tortoise located in Ivanpah 3 would be moved to the northern end of Ivanpah 3 in a caliche soil formation area.

While no critical habitat for desert tortoise would be impacted by the proposed project, the action is likely to adversely affect some individual desert tortoise and their habitat. This determination is based on the potential for incidental long-term loss of habitat from construction and operation, displacement of individuals, habitat fragmentation due to surface disturbance from the project, and the potential accidental loss of individuals from handling, tortoise relocation, and construction activities. Indirect impacts include an increase in noxious and invasive weeds which would reduce forage quality. Dust and increased human activity in the area would contribute to stress, possibly increasing susceptibility to disease. Construction and operation of the proposed project would require a federal endangered species "take" authorization.

Operational Impacts

The operational impacts include the permanent loss of 3,713 acres of potential habitat. As a result, impacts to desert tortoise include loss of forage, nesting sites, and cover sites, the potential replacement of native with non-native plant species, loss of dispersal areas and connectivity to other areas, contracted home ranges, and increased risk of predation by predators attracted to the area by increased human activity. Each of these impacts is discussed in more detail below.

Ravens, Coyotes, and Other Predators

Human activities in the ISEGS project area potentially provide food or other attractants in the form of trash, litter, or water, which draw unnaturally high numbers of tortoise predators such as the common raven, kit fox, and coyote. Common raven populations in some areas of the Mojave Desert have increased 1,500 percent from 1968 to 1988 in response to expanding human use of the desert (Boarman 2002). Since ravens were scarce in this area prior to 1940, the current level of raven predation on juvenile desert tortoises is considered to be an unnatural occurrence (BLM 1990, USFWS 2008c).

In addition to ravens, feral dogs have emerged as major predators of the tortoise. Dogs may range several miles into the desert and have been found digging up and killing desert tortoises (USFWS 1994; Evans 2001). Dogs brought to the project site with visitors may harass, injure, or kill desert tortoises, particularly if allowed off leash to roam freely in occupied desert tortoise habitat. The worker environmental awareness training required in mitigation measure **BIO-6** and restrictions on pets being brought to the site required of all personnel in mitigation measure **BIO-11** would reduce or eliminate the potential for these impacts.

Construction and operation of the ISEGS project would increase raven and coyote presence in the project area. Ravens depend on human encroachment to expand into areas where they were previously absent or in low abundance. Ravens habituate to human activities and are subsidized by the food and water, as well as roosting and nesting resources that are introduced or augmented by human encroachment. The Ivanpah Valley currently includes several unauthorized public and open community dumps (BLM 2001), and the casinos at Primm (4.5 miles from ISEGS) and the Primm Valley Golf Club (0.5 miles from ISEGS) provide food, water features, and roosting/nesting substrates (buildings, signs, lamps, and utility poles) that otherwise would be unavailable. This development adjacent to the proposed ISEGS provides year-round water and trash subsidies for the raven as well as nesting opportunities.

Small mammal, fox, coyote, rabbit, lizard, snake, and tortoise road kill along I-15, Nipton Road, Yates Well Road, Colosseum Road, and other local roads provides an additional attractant and subsidy for opportunistic predators/scavengers such as ravens. Road kills would mount with increased ISEGS construction and operations traffic, further exacerbating the raven/predator attractions and increasing desert tortoise predation levels.

The ISEGS area is already subject to elevated raven predation pressure and any cumulative loss of juvenile tortoise due to the further addition of raven subsidies could have a long-term effect on the Ivanpah tortoise population by reducing the recruitment of juvenile tortoises into the adult life stages. The effects of this shortage may not be apparent for years because tortoises do not typically reach sexual maturity until approximately 15 to 20 years of age.

To reduce the impacts of increased raven presence at the ISEGS project site, the applicant has prepared a draft Raven Management Plan (CH2M Hill 2008a) and has recommended additional avoidance and minimization measures. These recommendations were incorporated into the mitigation measures **BIO-11** and **BIO-12**, which would minimize the effects of increased predation on the Ivanpah Valley

population of desert tortoise. The USFWS is currently developing a raven management plan that would address some of these potential impacts on a regional basis (Croft 2008) and which would implement recommendations in the USFWS *Environmental Assessment to Implement a Desert Tortoise Recovery Plan Task: Reduce Common Raven Predation on the Desert Tortoise* (USFWS 2008a).

Increased Risk from Roads/Traffic

Vehicle traffic would increase as a result of construction and improvement of access roads, increasing the risk of injuring or killing desert tortoise. During the month-long time period in which the ISEGS workforce is at its largest, an estimate of the average daily traffic would include 39 transport buses and 192 personal vehicles (CH2M Hill 2007). Likewise during this time period, the average total of construction truck traffic would be approximately 145 vehicles per day. For all other periods during construction (and to a much greater extent during operations and maintenance activities) daily average vehicle activity would be far less.

The potential for increased traffic-related tortoise mortality is greatest along paved roads where vehicle frequency and speed is greatest though tortoises on dirt roads may also be affected depending on vehicle frequency and speed. Census data indicate that desert tortoise numbers decline as vehicle use increases and that tortoise sign increases with increased distance from roads. Additional unauthorized impacts that may occur from casual use of the access roads in the project area include unauthorized trail creation.

To minimize the risks of increased traffic fatality and other hazards associated with roads at the ISEGS project site, the applicant has proposed a variety of minimization measures that have been incorporated into mitigation measure **BIO-11**. These measures include confining vehicular traffic to and from the project site to existing routes of travel, prohibiting cross country vehicle and equipment use outside designated work areas, and imposing a speed limit of 20 miles per hour for project-related vehicles on Colosseum Road and other dirt access routes within desert tortoise habitat.

Closure/Decommissioning Impacts

Removal of facilities initially would have similar impacts to those described for construction. Reclamation following closure and decommissioning may take decades. Because reestablishment of desert vegetative communities would take decades and may differ in composition than the pre-disturbance vegetative community, these permanent changes in the vegetative communities would alter the ecosystem's ability to sustain the same density of desert tortoise that currently occur at the site.

Beneficial Impacts

The proposed project would not provide any beneficial impacts to desert tortoise.

4.3.2.1.5 Impacts to Special Status Birds

Mojave creosote bush scrub at the power plant site provides foraging, cover, and/or breeding habitat for migratory birds, including a number of special status bird species confirmed to be present at the site (golden eagle, burrowing owl, loggerhead shrike,

Crissal thrasher, and Brewer's sparrow). Power plant construction would eliminate nesting habitat and result in direct and cumulative impacts to these species due to habitat loss or injury/fatality of individuals.

Burrowing Owl, Loggerhead Shrike, Crissal thrasher, Bendire's thrasher, and Brewer's sparrow

Burrowing owl, loggerhead shrike, Crissal thrasher, and Brewer's sparrow were observed on the ISEGS site and suitable nesting and foraging habitat was identified. Loggerhead shrike, Crissal thrasher and Brewer's sparrow are likely to be year-round residents in the area. Bendire's thrasher was not identified during surveys but potential habitat exists within the site.

Construction Impacts

Construction activities would result in the disturbance of 4,073 acres of Mojave Desert habitat. If construction occurs during the breeding season, construction activities may result in the loss of active resident and migratory bird nests or young, a violation of the federal Migratory Bird Treaty Act and Fish and Game Code section 3503. The applicant has proposed mitigation measures to avoid and minimize impacts to nesting birds that have been incorporated into mitigation measures **BIO-11** (Impact Avoidance and Best Management Practices), **BIO-15** (Pre-construction Nest Surveys) and **BIO-16** (Burrowing Owl Avoidance and Impact Minimization Measures).

Implementation of the applicant-proposed mitigation measures and mitigation measure **BIO-22** for a MBTA Conservation Agreement would avoid direct impacts to nests, eggs, or young of migratory birds, and would minimize the impacts of construction disturbance to nesting birds.

Operational Impacts

Impacts to these special status species would be similar to other bird species, as described in the General Wildlife section above. Long-term loss of nesting and foraging habitat for these special status bird species would adversely affect local populations of these species within the Ivanpah Valley. Project facilities may cause injuries and mortalities due to collisions, heat-related effects, and disorientation. As discussed in the evaluation of cumulative impacts (Section 5), the ISEGS project would substantially contribute to the cumulative loss of Ivanpah Valley's biological resources, including these special status bird species. Mitigation measure **BIO-17**, the compensatory mitigation plan, could offset the loss of habitat for these species.

Closure/Decommissioning Impacts

Removal of facilities initially would have similar impacts to those described for construction. Reclamation following closure and decommissioning may take decades. Because reestablishment of desert vegetative communities would take decades and may differ in composition than the pre-disturbance vegetative community, these permanent changes in the vegetative communities would alter the ecosystem's ability to sustain the same types and numbers of special status bird species that currently occur at the site.

Beneficial Impacts

The proposed project would not provide any beneficial impacts to special status bird species.

Golden Eagle

Construction Impacts

Golden eagles are protected by the MBTA as well as the Bald Eagle and Golden Eagle Protection Act. The project area is over 4 miles from the nearest active eagle nest, so the construction, maintenance, and operation of the project is not expected to disturb the nesting eagles. Nevertheless, the project area is within the foraging distance for three eagle nests. The proposed project would account for the loss of up to 4,073 acres or ~5 percent of the foraging habitat available for the closest territory. This minimal amount of loss would not be considered large enough to affect the breeding success of eagles in the project vicinity.

There is insufficient information regarding the potential risk to birds from collisions with mirrors and towers or from burns from flying into the beam from heliostats to towers. The only study documenting bird collision and burning at a solar facility similar to the proposed project (McCrary et al. 1986) concluded that much of the bird mortality observed was due to an increased number of birds in the area resulting from adjacent evaporation ponds and agricultural fields that are not present in the vicinity of this project. Given the lack of data, the probable impact to eagles from collision or burning cannot be predicted, but it is not impossible that minor but sustained mortality could occur throughout the life of the project.

Operational Impacts

Operational impacts would be comparable to those experienced by other bird species within the project area. As discussed in Construction Impacts, golden eagles do not nest within the project area and while operation of the project would affect 3,713 acres, this loss would not substantially affect the overall amount of foraging habitat in the area. Operational impacts to golden eagles would be monitored and addressed as outlined in mitigation measure **BIO-28**.

Closure/Decommissioning Impacts

Removal of facilities initially would have similar impacts to those described for construction. Reclamation following closure and decommissioning may take decades. While reestablishment of desert vegetative communities would take decades and may differ in composition than the pre-disturbance vegetative community, the reclamation of project site would incrementally increase the amount of foraging habitat available to golden eagles in the region.

Beneficial Impacts

The proposed project would not provide any beneficial impacts to golden eagles.

4.3.2.1.6 Impacts to Special Status Mammals

Special Status Bat Species

Construction Impacts

Pallid and Townsend's big-eared bats have been reported within the project area. Because pallid bats roost in rock crevices and trees as well as caves and mine shafts, the species may experience some loss of roosting habitat. Townsend's big-eared bats primarily roost in caves and mines, therefore construction activities would not impact roost sites for this species. Both species would experience loss of foraging habitat up to 4, 073 acres. Construction impacts to special status bats would be comparable to construction impacts for other bat species, as described previously in the Impacts to Wildlife section.

Operational Impacts

Operation of the project would result in the permanent loss of 3,713 acres of potential habitat for special status bat species. Operational impacts to these bat species would include loss of foraging and roosting habitat; collision with communications towers, transmission lines, and other elevated structures; risk of heat-related injuries attributable to the reflected and focus beams of solar radiation between the heliostats and the power towers; attraction to nighttime lighting; increased dust; increased noise and increased human activity that disrupts normal behavior; hazards within movement corridors, hampering normal movement between foraging habitat and water sources; and habitat fragmentation. Although habitats adjacent to the project may support some displaced animals, species that are at or near carrying capacity could suffer some increased mortality rates due to displacement.

Closure/Decommissioning Impacts

Removal of facilities initially would have similar impacts to those described for construction. Reclamation following closure and decommissioning may take decades. While reestablishment of desert vegetative communities would take decades and may differ in composition than the pre-disturbance vegetative community, the reclamation of project site would incrementally increase the amount of foraging habitat available to special status bat species in the region. The absence of structures would reduce injuries and fatalities due to collision and heat-related impacts.

Beneficial Impacts

The proposed project would not provide any beneficial impacts to special status bat species.

American Badger

Construction Impacts

American badgers were detected on the ISEGS site, and the site includes suitable foraging and denning habitat for this species. The American badger is a state-listed

species, protected under Title 14, California Code of Regulations (sections 670.2 and 670.5).

Construction of the ISEGS project would disturb 4,073 acres of potential American badger habitat. Based on home range sizes, the project site could potentially support three or more individuals. Construction activities could kill or injure American badgers by crushing with heavy equipment, or could bury them within a den, particularly since badgers are nocturnal and undergo torpor in winter months. Construction activities could also result in disturbance or harassment of individuals.

Mitigation measure **BIO-11** requires that concurrent with the desert tortoise clearance survey, a qualified biologist would perform a preconstruction survey for badger dens in the project area, including areas within 250 feet of all project facilities, utility corridors, and access roads. If badgers are detected within the fenced ISEGS project site during desert tortoise clearance surveys, the applicant shall develop and implement trapping and relocation plan in consultation with the Energy Commission staff and CDFG. Badgers are highly territorial, so displaced or relocated badgers could suffer some increased mortality rates due to displacement if surrounding areas or relocation sites are at carrying capacity.

Operational Impacts

The ISEGS project would permanently remove approximately 3,713 acres of foraging and denning habitat for American badgers and would fragment and reduce the value of foraging and denning habitat adjacent to the project site. This habitat loss and degradation could adversely affect American badger populations within the Ivanpah Valley. As discussed in the cumulative impact section (Section 5), the ISEGS project would substantially contribute to the cumulative loss of Ivanpah Valley's biological resources, including American badgers. Mitigation measure **BIO-17**, the compensatory mitigation plan, could offset the loss of habitat for this species.

Closure/ Decommissioning Impacts

Removal of facilities initially would have similar impacts to those described for construction. Reclamation of plant communities following closure and decommissioning may take decades. Because reestablishment of desert vegetative communities would be tong-term and ultimately may differ in composition than the pre-disturbance vegetative community, the altered vegetative communities could limit the ecosystem's ability to sustain the same density of American badger that currently occur at the site.

Beneficial Impacts

The proposed project would not provide any beneficial impacts to American badger.

<u>Nelson's Bighorn Sheep</u>

Construction Impacts

In general, bighorn sheep primarily occupy mountainous terrain for habitat, using alluvial fans and washes as seasonal foraging habitat and mountain valleys as movement corridors between mountain ranges. Nelson's bighorn sheep are known to occur in the

nearby Clark Mountains, and could use the ISEGS project site as foraging habitat and possibly as a migratory corridor (CDFG 2008b). However, the AFC (CH2M Hill 2007) does not provide sufficient project-specific information on use of the site by Nelson's bighorn sheep to identify specific areas that might provide foraging habitat or movement corridors, nor are studies available detailing use of the Ivanpah Valley by bighorn sheep.

The project could reduce the availability of seasonal forage for Nelson's bighorn sheep, though the project area represents a small fraction of the total available habitat. The proposed ISEGS project boundaries and security fencing were shifted approximately 130 to 340 feet away from adjacent hills to provide a wider wildlife corridor (CH2M Hill 2007 p. 5.2-54).

Mitigation measure **BIO-24** would prohibit the use of barbed wire fence on the northern perimeter of the Ivanpah 3 site, unless required for security reasons.

Operational Impacts

Throughout their range bighorn sheep have suffered considerable population declines in the past 140 years, and metapopulations have been fragmented by roads and other barriers, genetic isolation due to increased habitat fragmentation with a resulting decline in genetic diversity (Bleich et al. 1996, Epps et al. 2005). Disease, sometimes brought about by contacts with domestic sheep, drought, human activity, and predation interacting with other anthropogenic factors may also have contributed to declines in bighorn sheep populations (Wehausen 2005).

Based on consultation with experts and review of the literature (Jaeger 1994), operation of the ISEGS project would reduce foraging opportunities for bighorn on the bajada. Additionally, the project would narrow the width of movement corridors between Clark Mountain and the Stateline Hills. Human disturbance would increase stress to bighorn sheep, from dust and human activity. Stress has been shown to increase frequency of disease in some populations. Loss of surface water sources may diminish the viability of existing populations (Wehausen 2005). These direct and indirect impacts would contribute to the cumulative impacts to bighorn sheep in the eastern Mojave Desert.

Implementation of mitigation measure **BIO-19** would create a new water source in the eastern part of the Clark Mountain range or in the State Line Hills outside of designated wilderness. This artificial water source would supplement existing supplies that may be a limiting factor to local bighorn sheep populations. Further, the water source likely would shift foraging opportunities into other areas within the lower elevations of the mountains, and away from areas of the bajada lost to ISEGS facilities and the zone of disturbance on the north. This water source would also serve to attract the bighorn during seasonal movements and keep them in the mountainous portion of the wildlife corridor.

The CDFG (CDFG 2008b) and others (SCBH 2009a, DOW 2008, 2009a) expressed concerns regarding potential impacts of the ISEGS wells and groundwater pumping on springs used by bighorn sheep. The proposed project includes the installation of two groundwater wells east of Ivanpah 2. Water consumption for all three phases of all three projects is estimated at less than 100 acre-feet/year for the 50-year life of the project

(CH2M Hill 2007 p. 5.5-17). This level of pumping, combined with all other projects, is not expected to substantially affect overall groundwater recharge in the Ivanpah Valley (CH2M Hill 2007 p. 5.15-20). Section 4.10 provides an analysis of this issue, and concludes that the seeps and springs located in the Clark Mountain are ephemeral and located upgradient and over three miles away from the project's proposed pumping wells. The seeps and springs derive their water from precipitation further upgradient in the Clark Mountains and beyond the potential reach of any cone of depression that would result from the project's proposed groundwater pumping. The project is therefore unlikely to affect these springs and the bighorn sheep that use these water sources.

Closure/Decommissioning Impacts

Removal of facilities initially would have similar impacts to those described for construction. Reclamation of plant communities following closure and decommissioning may take decades. Because reestablishment of desert vegetative communities would be tong-term and ultimately may differ in composition than the pre-disturbance vegetative community, the altered vegetative communities could limit the ecosystem's ability to sustain the same density of bighorn sheep that currently seasonally utilize the site.

Beneficial Impacts

The proposed project would not provide any beneficial impacts to bighorn sheep.

4.3.2.2 Mitigated Ivanpah 3 Alternative

The Mitigated Ivanpah 3 Alternative, with respect to biological resources, would be comparable to that described for the proposed project. The project location would be almost identical with that for the proposed project, with the exception of the elimination of a 433-acre area in the northern portion of the Ivanpah Unit 3.

The Mitigated Ivanpah 3 Alternative was developed to reduce the overall surface footprint of the project, specifically in an area of high quality native habitat characterized by numerous ephemeral washes. This area contains special status species, including desert tortoise. Further, the reduction in surface disturbance along the northern portion of the project would reduce the encroachment on potential movement corridors by big game, particularly bighorn sheep. Thus, the Mitigated Ivanpah 3 Alternative was developed to reduce impacts to biological resources.

<u>Affected Environment</u>

Vegetation

Because the Mitigated Ivanpah 3 Alternative area is a subset of the proposed project area, the plant communities, including native and noxious weeds, found within the alternative would be the same as those that occur in the proposed project area. However, the Mitigated Ivanpah 3 Alternative would exclude 433 acres of high quality native plant communities located along the northern portion of the proposed project area.

Construction of the Mitigated Ivanpah 3 Alternative would disturb 4,280 acres. In 2007 and 2008, species-specific surveys were conducted within the proposed project area for special status plant species and CNPS species of concern. **Table 4.3-4** summarizes the survey results, providing the estimated number of populations within the project area and the estimated percentage of those populations that would be avoided as result of the Mitigated Ivanpah 3 Alternative implementation.

Table 4.3-4
Plant Species of Concern Identified within the Mitigated Ivanpah 3 Alternative Area[1]

Common Name	Scientific Name	Status[2]	Number of Localities		Percent of Locations Avoided	
			Proposed Action	Mitigated Ivanpah 3	Proposed Action	Mitigated Ivanpah 3
Mojave milkweed	*Asclepias nyctaginifolia*	___/ 2.1	50	49	86	84
Desert pincushion	*Coryphantha chlorantha*	___/ 2.1	95	72	45	34
Nine-awned pappus grass	*Enneapogon desvauxii*	___/ 2.2	0	63	0	48
Parish's club-cholla	*Grusonia* [=*Opuntia*] *parishii*	___/ 2.2	29	28	22	21
Rusby's desert mallow	*Sphaeralcea rusbyi* var. *eremicola*	S / 1B.2	10	10	100	100

[1]Small-flowered androstephium (*Androstephium breviflorum*) was not identified within the Ivanpah 3 site during 2007 or 2008 surveys and; therefore, is not included within this table. Utah vine milkweed (*Cynanchum utahense*) and the desert portulaca (*Portulaca halimoides*) were identified within the Ivanpah 3 site during 2008 surveys; however, population-specific locations are unknown.

[2]Status: S = BLM Sensitive Species

California Native Plant Society status includes: List 1B = Rare, threatened, or endangered in California and elsewhere; List 2 Rare, threatened, or endangered in California but more common elsewhere; List 3 = Plants which need more information; List 4 = Limited distribution; a watch list; 0.1 = Seriously threatened in California (high degree/immediacy of threat); 0.2 = Fairly threatened in California (moderate degree/immediacy of threat); 0.3 = Not very threatened in California (low degree/immediacy of threats or no current threats known).

Special Status Plant Species

Rusby's Desert Mallow

Surveys conducted in 2007 and 2008 for Rusby's desert mallow found widely-scattered distribution patterns. The surveys identified ten locations containing Rusby's desert mallow. Five of the locations are outside of the proposed project site. One location is within the 433-acre northern portion of Ivanpah Unit 3, two are within the proposed Ivanpah Unit 3 site, one is within one of the smaller mitigation areas, and the remainder is within other portions of the project site. In the re-configured CLA associated with the Mitigated Ivanpah 3 Alternative, all three Rare Plant Mitigation Areas combined contain relatively few numbers of Rusby's desert mallow.

Wildlife

Because the Mitigated Ivanpah 3 Alternative area is a subset of the proposed project area, the wildlife species found within the alternative would be the same as those found in the proposed project.

Special Status Wildlife Species

Because the Mitigated Ivanpah 3 Alternative area is a subset of the proposed project area, the special status wildlife species found within the alternative would be the same as those found in the proposed project. Surveys within the 433 acres excluded from the Ivanpah 3 Alternative contained three tortoises, with two additional tortoises located in close proximity but within the surface disturbance footprint for the Mitigated Ivanpah 3 Alternative.

Other special status species, such as banded Gila monster and special status bird and bat species are expected to be found within the Mitigated Ivanpah 3 Alternative site.

4.3.2.2.1 Vegetation

<u>**Construction Impacts**</u>

Since the 433-acre site eliminated from the proposed project is considered of relatively high quality and diverse native habitat, the benefits would be greater than avoidance of comparable acreage in other, lower quality habitat areas within the project area.

Construction-related impacts would be consistent with those described within the DEIS (BLM and CEC 2009a); however, the Mitigated Ivanpah 3 Alternative would result in the elimination of 433 acres from surface-disturbance activities compared to the proposed project. Potential impacts to sensitive plant species from surface disturbance-related activities may include the loss of individuals as a result of crushing from construction vehicles and equipment. Because surface disturbance would be distributed over a relatively large geographic area and within an ecological-specific niche (i.e., Mojave Desert Ecoregion), population-level impacts to sensitive plant species may occur. Impacts may include the long-term loss of potentially suitable habitat until closure/decommissioning and native vegetation has been reestablished. Indirect impacts may include the introduction or spread of noxious weeds and invasive plant species. Noxious weed control through use of biological, mechanical, chemical, or various alternative methods may also indirectly impact species individuals and may alter potentially suitable habitat through changes in vegetation community cover and composition.

As previously stated, the implementation of the Mitigated Ivanpah 3 Alternative would result in the reduction of the project's surface disturbance footprint by 433 acres, or approximately 12.5 percent. Prior to construction, specified plants species within any project-related surface disturbance areas would be salvaged and relocated to the 7-acre Rare Plant Transplantation Area. The Rare Plant Transplantation Area would only be used for salvaged plant species of concern to reduce the amount of disturbance to salvaged plants should pre-construction surveys determine that remedial measures be needed. The 59-acre Succulent Nursery Area would be used for salvaged cacti and

yucca species. Pending further consultation and BLM and Energy Commission review and concurrence, additional construction-related mitigation may be required.

To the maximum extent practical, plant species of concern located within the heliostat fields would be avoided and protected during construction through the use of fencing to avoid inadvertent encroachment. Fencing would be removed following construction and an alternative marking material (e.g., posts or stakes) would be installed to indicate the areas where avoided plants are located. This would allow ecological connectivity between the 433-acre northern portion of Ivanpah Unit 3, CLA, extant populations within the heliostat fields, and adjacent areas of undisturbed contiguous habitat, allowing ecological processes such as seed dispersal and pollinator movement to occur. Monitoring of these extant plant species of concern within the heliostat fields would be conducted.

Operational Impacts

Operation-related impacts would be consistent with those described for the proposed project. However, the Mitigated Ivanpah 3 Alternative would result in the elimination of 433 acres from inspection, repair, and maintenance activities compared to the proposed project. Direct and indirect impacts to plant communities and individual species from routine operational activities would be similar to those described for construction impacts. In addition, potential impacts to plant species from operational activities may include the loss of individuals as a result of shading caused by heliostat placement. To maintain the ground surface beneath the heliostats free of vegetation obstructions, operational mowing and weed control through the use of biological, mechanical, chemical, or various alternative methods may be conducted. As a result, sensitive plant species may be directly impacted by trampling, partial, or full removal as a result of vegetation maintenance and indirectly impacted as a result of altering potentially suitable habitat through changes in vegetation community cover and composition. Maintenance activities would increase vehicular traffic and increase the potential for dispersal of noxious and invasive weeds.

Closure/Decommissioning Impacts

The type of closure and decommissioning-related impacts would be consistent with those described for the proposed project. However, the Mitigated Ivanpah 3 Alternative would reduce the number of acres requiring facility removal and subsequent reclamation activities by 433 acres (approximately 12.5 percent) compared to the proposed project. Direct and indirect impacts to biological resources from closure/decommissioning activities would be similar to those described for construction impacts. Reestablishment of desert vegetative communities would take decades and may differ in composition than the pre-disturbance vegetative community. Noxious and invasive weeds would likely be more prevalent than existing conditions. Permanent changes in the vegetative communities would alter the ecosystem's ability to sustain the same type and numbers of species currently found at the site.

While the types of impacts associated with the closure and decommissioning of facilities would be consistent with those described for the proposed project, the Mitigated Ivanpah 3 Alternative would result in the elimination of 433 acres from impacts

associated with facility removal and subsequent reclamation activities compared to the proposed project. Direct and indirect impacts to sensitive plant species from closure/decommissioning activities would be similar to those described for construction impacts. In addition, potential impacts to CNPS plant species from closure/decommissioning activities may include the loss of individuals during structure removal and subsequent revegetation. If biological, mechanical, chemical, or various alternative methods are used to control noxious weed species during closure, direct and indirect impacts may include partial or full plant removal and indirectly alter potentially suitable habitat through changes in vegetation community cover and composition.

Long-term restoration of the project area likely would result in a greater frequency of noxious and invasive weeds as well as lower density and diversity of native plant species, including sensitive plant species.

Beneficial Impacts

The Mitigated Ivanpah 3 Alternative would not provide beneficial impacts to native plant communities.

4.3.2.2.2 Special Status Plant Species

Construction Impacts

Construction activities would have limited impacts to Rusby's desert mallow. Plant avoidance and protection areas within the heliostat fields would be fenced during construction to avoid inadvertent encroachment. Dust from construction activities may stress plants within the construction area.

Fencing would be removed following construction and an alternative marking material (e.g., posts or stakes) would be installed for operations to indicate the areas where avoided plants are located. This mitigation measure attempts to preserve ecological connectivity between the 433-acre northern portion of Ivanpah Unit 3, the smaller Rusby's desert mallow avoidance and protection areas, and other areas of undisturbed contiguous habitat, allowing seed dispersal, pollinator movement, and other ecological processes to occur. Rusby's desert mallow plant avoidance and protection areas within the heliostat fields would be monitored to ensure the areas remain protected.

Operational Impacts

Compared to the proposed project, the Mitigated Ivanpah 3 plant avoidance and protection approach provides large areas of sensitive plant mitigation areas that would have a greater degree of protection from operational activities.

Closure/Decommissioning Impacts

Closure and decommissioning-related impacts would be consistent with those described for plant communities for the Mitigated Ivanpah 3 Alternative. In addition, potential impacts to special status plant species from closure/decommissioning activities may include the loss of individuals during structure removal and subsequent revegetation activities.

The ability of Rusby's desert mallow to recolonize the area would be improved, relative to the proposed project, due to the preservation of ecological connectivity with other areas of undisturbed, contiguous native plant communities, allowing seed dispersal, pollinator movement, and other ecological processes to occur. However, long-term restoration of the project area likely would result in a greater frequency of noxious and invasive weeds as well as lower density and diversity of native plant species, including special status plant species.

Beneficial Impacts

The Mitigated Ivanpah 3 Alternative would not provide beneficial impacts to special status plant species.

4.3.2.2.3 Wildlife

Construction Impacts

While the types of impacts associated with construction would be consistent with those described for the proposed project, the Mitigated Ivanpah 3 Alternative would result in the elimination of 433 acres of high quality habitat. Eliminating this high quality habitat along the northern portion of the Ivanpah 3 site would help retain large scale ecological processes and migration corridors that are beneficial to wildlife species. Many impacts to wildlife resources would be incrementally reduced by the amount of habitat eliminated from disturbance.

Operational Impacts

Operation impacts would be comparable to those described for the proposed project, with the reduction of permanent disturbance reduced by 433 acres. Operational impacts would include increased noise, human presence, and light to the area. Sources of noise during operations would be from mechanical equipment, vehicle traffic, and activities in the maintenance facility. Maintenance activities would increase vehicular traffic and increase the potential for dispersal of noxious and invasive weeds.

Closure/Decommissioning Impacts

While the types of impacts associated with the closure and decommissioning of facilities would be consistent with those described for the proposed project, the Mitigated Ivanpah 3 Alternative would result in the elimination of 433 acres from impacts associated with facility removal and subsequent reclamation activities compared to the proposed project. Because reestablishment of desert vegetative communities would take decades and may differ in composition than the pre-disturbance vegetative community, these permanent changes in the vegetative communities would alter the ecosystem's ability to sustain the same type and numbers of wildlife species currently found at the site.

Compared to the proposed project, the ability of wildlife to recolonize the area would be improved due to the preservation of ecological connectivity with other areas of undisturbed, contiguous native habitat. The ability of individual species to eventually recolonize the reclaimed area will depend on the proximity of other populations,

connectivity of habitats, and the mobility of the species. Terrestrial species with small home ranges will not colonize as quickly, if at all, compared to flying organisms or wildlife with large home ranges. The degree of habitat fragmentation within the region also will affect wildlife species ability to recolonize the reclaimed area.

Long-term restoration of the project area likely would result in a lower density and diversity of wildlife species, compared to the original intact ecosystem.

<u>**Beneficial Impacts**</u>

The Mitigated Ivanpah 3 Alternative would not provide any beneficial impacts associated with wildlife resources.

4.3.2.2.4 Special Status Wildlife Species

<u>**Impacts to Special Status Reptiles**</u>

Banded Gila Monster

Construction Impacts

Gila monsters were not detected during the 2007/2008 surveys, but this species is difficult to detect and cannot be assumed to be absent based on the absence of observations. If present within the project area, the elimination of 433 acres of high quality habitat along the northern portion of the Ivanpah 3 site may preserve some important habitat. Nevertheless, if Gila monsters are present they may be harmed during clearing, grading and trenching activities or may become entrapped within open trenches and pipes. Construction activities could also result in direct mortality, injury, or harassment of individuals as a result of encounters with vehicles or heavy equipment. While relocation of banded Gila monster may temporarily remove the lizard from the construction area, this species shows high fidelity to its original site. Tortoise fencing may provide exclusion protection, though that has not been documented. Mitigation measure **BIO-11** requires that concurrent with the desert tortoise clearance survey, a biologist perform a preconstruction survey for Gila monsters in the project area, and implement appropriate impact avoidance and minimization measures if detected.

Construction of the Mitigated Ivanpah 3 Alternative would disturb 3,640 acres that might provide cover, foraging, and breeding habitat for banded Gila monsters. Given that there were no banded Gila monster or sign identified during surveys and the difficulty surveying for this species, the presence of this species at the site cannot be confirmed. For this evaluation, the species is assumed to be present. Mitigation measure **BIO-17**, the compensatory mitigation plan, could offset the loss of habitat for this species, minimizing potential impact to the species.

Operational Impacts

Operational impacts would be comparable to those experienced by other reptiles within the project area as described above for wildlife resources. If present within the Mitigated Ivanpah 3 Alternative area, adverse impacts to individual(s) are probable. Mitigation measure **BIO-17**, the compensatory mitigation plan, could offset the loss of habitat for this species.

Closure/Decommissioning Impacts

Removal of facilities initially would have similar impacts to those described for construction. Reclamation following closure and decommissioning may take decades. Because reestablishment of desert vegetative communities would take decades and may differ in composition than the pre-disturbance vegetative community, these permanent changes in the vegetative communities would alter the ecosystem's ability to sustain the same numbers of banded Gila monster that potentially currently occur at the site. Given the solitary and secretive habits of the banded Gila monster, impacts to individuals and the ability of any nearby populations to recolonize the site in the future is speculative.

Based on the low probability of occurrence within the site, the Mitigated Ivanpah 3 Alternative would not likely adversely affect banded Gila monster.

Beneficial Impacts

The Mitigated Ivanpah 3 Alternative would not provide any beneficial impacts to banded Gila monster.

Desert Tortoise

Construction Impacts

Like the proposed project, the Mitigated Ivanpah 3 Alternative would have direct, adverse impacts to 3,640 acres of desert tortoise habitat, which would require state and federal endangered species "take" authorizations. The Mitigated Ivanpah 3 Alternative was created to preserve 433 acres of high quality habitat containing desert tortoise. The area would maintain a larger expanse of undisturbed habitat and retain important ecological functions, including connectivity with other undisturbed desert tortoise habitat.

Like the proposed project, tortoises present along roads, and within 500 meters of the western and northern boundaries would be moved out of harm's way, but immediately adjacent to the project site exclusion fencing. Tortoises present within the boundary of the Construction Logistics Area, Ivanpah 1, and 2 would be translocated to the NPS desert tortoise research center facility in the Mojave National Preserve. Instead of being moved to the west, tortoises from Ivanpah 3 would be moved into the 433 acre area north of the Mitigated Ivanpah 3 unit. In addition to the direct loss of tortoise habitat, the proposed project would also fragment and degrade adjacent habitat, and could promote the spread of invasive plants and desert tortoise predators (ravens).

If the Mitigated Ivanpah 3 Alternative was selected and approved by the BLM and Energy Commission, the ROW terms and conditions and the Conditions for Certification identified for the proposed action would be enforced on the Mitigated Ivanpah 3 Alternative. BLM would also require the implementation of any USFWS mitigation identified in the Biological Opinion. As a result, residual impacts to desert tortoise may affect individuals but is unlikely to adversely affect the viability of desert tortoise populations.

Operational Impacts

Operational impacts would be comparable to those experienced by other reptiles within the project area as described above for wildlife resources. Implementation of the applicant-committed mitigation measures, the Mitigation Measures, and USFWS mitigation measures from the Biological Opinion would minimize impacts to desert tortoise in the Mitigated Ivanpah 3 Alternative area. Mitigation measure **BIO-17**, the compensatory mitigation plan, could offset the loss of habitat for this species.

Closure/Decommissioning Impacts

Removal of facilities initially would have similar impacts to those described for construction. Reclamation following closure and decommissioning may take decades. Because reestablishment of desert vegetative communities would take decades and may differ in composition than the pre-disturbance vegetative community, these permanent changes in the vegetative communities would alter the ecosystem's ability to sustain the same numbers of desert tortoise that currently occur at the site. By preserving high quality habitat along the northern portionof the Ivanpah 3 site, connectivity with other areas of undisturbed desert tortoise habitat would be retained. Consequently, the Mitigated Ivanpah 3 Alternative would enhance the ability of any nearby populations to recolonize the site in the future, compared to the proposed project.

Beneficial Impacts

The Mitigated Ivanpah 3 Alternative would not provide any beneficial impacts associated with special status wildlife species.

4.3.2.2.5 Impacts to Special Status Birds

Mojave creosote bush scrub at the power plant site provides foraging, cover, and/or breeding habitat for migratory birds, including a number of special status bird species confirmed to be present at the site (golden eagle, burrowing owl, loggerhead shrike, Crissal thrasher, and Brewer's sparrow). Power plant construction would eliminate nesting habitat and result in direct and cumulative impacts to these species due to habitat loss or injury/fatality of individuals.

<u>Burrowing Owl, Loggerhead Shrike, Crissal thrasher, Bendire's thrasher, and Brewer's sparrow</u>

Burrowing owl, loggerhead shrike, Crissal thrasher, and Brewer's sparrow were observed on the ISEGS site and suitable nesting and foraging habitat was identified. Loggerhead shrike, Crissal thrasher and Brewer's sparrow are likely to be year-round residents in the area. Bendire's thrasher was not found during surveys but potential habitat exists in the alternative site.

Construction Impacts

Construction activities would result in the disturbance of 3,640 acres of Mojave Desert habitat. Like the proposed project, if construction occurs during the breeding season, construction activities may result in the loss of active resident and migratory bird nests

or young, a violation of the federal Migratory Bird Treaty Act and Fish and Game Code section 3503. The applicant has proposed mitigation measures to avoid and minimize impacts to nesting birds that have been incorporated into mitigation measures **BIO-11** (Impact Avoidance and Best Management Practices), **BIO-15** (Pre-construction Nest Surveys) and **BIO-16** (Burrowing Owl Avoidance and Impact Minimization Measures).

Implementation of the applicant-proposed mitigation measures and mitigation measure **BIO-22** for a MBTA Conservation Agreement would avoid direct impacts to nests, eggs, or young of migratory birds, and would minimize the impacts of construction disturbance to nesting birds.

Operational Impacts

The types of impacts to these special status species would be comparable to the proposed project. Long-term loss of nesting and foraging habitat for these special status bird species would adversely affect local populations of these species within the Ivanpah Valley. However, impacts would be incrementally less than the proposed action due to the preservation of 433 acres of high quality habitat along the northern portion of the Ivanpah 3 site. Project facilities may cause injuries and mortalities due to collisions, heat-related effects, and disorientation. As discussed in the cumulative impact section (Section 5), the Mitigated Ivanpah 3 Alternative would substantially contribute to the cumulative loss of Ivanpah Valley's biological resources, including these special status bird species. Mitigation measure **BIO-17**, the compensatory mitigation plan, could offset the loss of habitat for these species.

Closure/Decommissioning Impacts

Removal of facilities initially would have similar impacts to those described for construction. Reclamation following closure and decommissioning may take decades. Because reestablishment of desert vegetative communities would take decades and may differ in composition than the pre-disturbance vegetative community, these permanent changes in the vegetative communities would alter the ecosystem's ability to sustain the same types and numbers of special status bird species that currently occur at the site.

Beneficial Impacts

The Mitigated Ivanpah 3 Alternative would not provide any beneficial impacts to special status bird species.

<u>Golden Eagle</u>

Construction Impacts

Golden eagles are protected by the MBTA as well as the Bald Eagle and Golden Eagle Protection Act. The project area is over 4 miles from the nearest active eagle nest, so the construction, maintenance, and operation of the project is not expected to disturb the nesting eagles. Nevertheless, the project area is within the foraging distance for three eagle nests. The proposed project would account for the loss of up to 3,640 acres of the foraging habitat available. This minimal amount of loss would not be considered large enough to affect the breeding success of eagles in the project vicinity.

There is a potential risk to birds from collisions with mirrors and towers or from burns from flying into the beam from heliostats to towers. The only study documenting bird collision and burning at a solar facility similar to the proposed project (McCrary et al. 1986) concluded that much of the bird mortality observed was due to an increased number of birds in the area resulting from adjacent evaporation ponds and agricultural fields that are not present in the vicinity of this project. Therefore, it is possible that the results of that study overestimate the magnitude of the impacts that could occur as a result of the proposed project. Because information regarding these impacts is limited, mitigation measure **BIO-23** would require the conduct of surveys to collect data on bird and bat mortality. Should adverse impacts to these species be identified as a result of those surveys, additional mitigation could be developed to address those impacts.

Operational Impacts

Operational impacts would be comparable to those experienced by other bird species within the project area. As discussed in Construction Impacts, golden eagles do not nest within the project area and while operation of the project would affect 3,270 acres, this loss would not substantially affect the overall amount of foraging habitat in the area. Operational impacts to golden eagles would be monitored and addressed as outlined in mitigation measure **BIO-28**.

Closure/Decommissioning Impacts

Removal of facilities initially would have similar impacts to those described for construction. Reclamation following closure and decommissioning may take decades. While reestablishment of desert vegetative communities would take decades and may differ in composition than the pre-disturbance vegetative community, the reclamation of project site would incrementally increase the amount of foraging habitat available to golden eagles in the region.

Beneficial Impacts

The Mitigated Ivanpah 3 Alternative would not provide any beneficial impacts to golden eagles.

4.3.2.2.6 Impacts to Special Status Mammals

<u>**Special Status Bat Species**</u>

Construction Impacts

Pallid and Townsend's big-eared bats have been reported within the project area. Because pallid bats roost in rock crevices and trees as well as caves and mine shafts, the species may experience some loss of roosting habitat. Townsend's big-eared bats primarily roost in caves and mines, therefore construction activities would not impact roost sites for this species. Both species would experience loss of foraging habitat up to 3,640 acres associated with the construction of the Mitigated Ivanpah 3 Alternative. Construction impacts to special status bats would be comparable to construction impacts for other bat species.

Operational Impacts

Operation of the Mitigated Ivanpah 3 Alternative would result in the permanent loss of 3,270 acres of potential habitat for special status bat species. Operational impacts to these bat species would include loss of foraging and roosting habitat; collision with communications towers, transmission lines, and other elevated structures; risk of heat-related injuries attributable to the reflected and focus beams of solar radiation between the heliostats and the power towers; attraction to nighttime lighting; increased dust; increased noise and increased human activity that disrupts normal behavior; hazards within movement corridors, hampering normal movement between foraging habitat and water sources; and habitat fragmentation. Although habitats adjacent to the project may support some displaced animals, species that are at or near carrying capacity could suffer some increased mortality rates due to displacement.

Closure/Decommissioning Impacts

Removal of facilities initially would have similar impacts to those described for construction. Reclamation following closure and decommissioning may take decades. While reestablishment of desert vegetative communities would take decades and may differ in composition than the pre-disturbance vegetative community, the reclamation of project site would incrementally increase the amount of foraging habitat available to special status bat species in the region. The absence of structures would reduce injuries and fatalities due to collision and heat-related impacts.

Beneficial Impacts

The Mitigated Ivanpah 3 Alternative would not provide any beneficial impacts to special status bat species.

American Badger

Construction Impacts

American badgers were detected on the ISEGS site, and the Mitigated Ivanpah 3 site includes suitable foraging and denning habitat for this species. The American badger is state-listed species, protected under Title 14, California Code of Regulations (sections 670.2 and 670.5).

Construction of the ISEGS project would disturb 3,630 acres of potential American badger habitat. Based on home range sizes, the project site could potentially support three or more individuals. Construction activities could kill or injure American badgers by crushing with heavy equipment, or could bury them within a den, particularly since badgers are nocturnal and undergo torpor in winter months. Construction activities could also result in disturbance or harassment of individuals.

Mitigation measure **BIO-11** requires that concurrent with the desert tortoise clearance survey, a qualified biologist would perform a preconstruction survey for badger dens in the project area, including areas within 250 feet of all project facilities, utility corridors, and access roads. If badgers are detected within the fenced ISEGS project site during desert tortoise clearance surveys, the applicant shall develop and implement trapping and relocation plan in consultation with the Energy Commission staff and CDFG.

Badgers are highly territorial, so displaced or relocated badgers could suffer some increased mortality rates due to displacement if surrounding areas or relocation sites are at carrying capacity.

Operational Impacts

The Mitigated Ivanpah 3 Alternative would permanently remove approximately 3,270 acres of foraging and denning habitat for American badgers and would fragment and reduce the value of foraging and denning habitat adjacent to the project site. This habitat loss and degradation could adversely affect American badger populations within the Ivanpah Valley. However, compared to the proposed project, the preservation of the 433 acres of high quality habitat along the northern portion of the Ivanpah 3 site would maintain ecological connections to other nearby undisturbed habitats. As discussed in the cumulative impact section (Section 5), the ISEGS project would substantially contribute to the cumulative loss of Ivanpah Valley's biological resources, including American badgers. Mitigation measure **BIO-17**, the compensatory mitigation plan, could offset the loss of habitat for this species.

Closure/Decommissioning Impacts

Removal of facilities initially would have similar impacts to those described for construction. Reclamation of plant communities following closure and decommissioning may take decades. Because reestablishment of desert vegetative communities would be tong-term and ultimately may differ in composition than the pre-disturbance vegetative community, the altered vegetative communities could limit the ecosystem's ability to sustain the same density of American badger that currently occur at the site.

Beneficial Impacts

The Mitigated Ivanpah 3 Alternative would not provide any beneficial impacts to American badger.

<u>Nelson's Bighorn Sheep</u>

Construction Impacts

In general, bighorn sheep primarily occupy mountainous terrain for habitat, using alluvial fans and washes as seasonal foraging habitat and mountain valleys as movement corridors between mountain ranges. Nelson's bighorn sheep are known to occur in the nearby Clark Mountains, and could use the ISEGS project site as foraging habitat and possibly as a migratory corridor (CDFG 2008b). However, the AFC (CH2M Hill 2007) does not provide sufficient project-specific information on use of the site by Nelson's bighorn sheep to identify specific areas that might provide foraging habitat or movement corridors, nor are studies available detailing use of the Ivanpah Valley by bighorn sheep.

Mitigation measure **BIO-24** would prohibit the use of barbed wire fence on the northern perimeter of the Ivanpah 3 site, unless required for security reasons.

Operational Impacts

One of the primary objectives of the Mitigated Ivanpah 3 Alternative was to increase the availability of seasonal forage for Nelson's bighorn sheep on the alluvial fan, though the project area represents a small fraction of the total available habitat. Furthermore, the Mitigated Ivanpah 3 Alternative would preserve 433 acres of high quality habitat along the northern portion of the Ivanpah 3 site. This modification would enlarge the available movement corridor for bighorn sheep and other big game between Clark Mountain and the Stateline Hills. This modification would reduce direct and indirect impacts associated with human encroachment, such as increased stress from dust and human activity. Stress has been shown to increase frequency of disease in some populations. Loss of surface water sources also may diminish the viability of existing populations (Wehausen 2005). These direct and indirect impacts would contribute to the cumulative impacts to bighorn sheep in the eastern Mojave Desert.

Implementation of mitigation measure **BIO-19** would create a new water source in the eastern part of the Clark Mountain range or in the State Line Hills outside of designated wilderness. This artificial water source would supplement existing supplies that may be a limiting factor to local bighorn sheep populations. Further, the water source likely would shift foraging opportunities into other areas within the lower elevations of the mountains, and away from areas of the bajada lost to ISEGS facilities and the zone of disturbance on the north. This water source would also serve to attract the bighorn during seasonal movements and keep them in the mountainous portion of the wildlife corridor.

The CDFG (CDFG 2008b) and others (SCBH 2009a, DOW 2008, 2009a) expressed concerns regarding potential impacts of the ISEGS wells and groundwater pumping on springs used by bighorn sheep. The proposed project includes the installation of two groundwater wells east of Ivanpah 2. Water consumption for all three phases of all three projects is estimated at less than 100 acre-feet/year for the 50-year life of the project (CH2M Hill 2007 p. 5.5-17). This level of pumping, combined with all other projects, is not expected to substantially affect overall groundwater recharge in the Ivanpah Valley (CH2M Hill 2007 p. 5.15-20). Section 4.10 provides an analysis of this issue, and concludes that the seeps and springs located in the Clark Mountain are ephemeral and located upgradient and over three miles away from the project's proposed pumping wells. The seeps and springs derive their water from precipitation further upgradient in the Clark Mountains and beyond the potential reach of any cone of depression that would result from the project's proposed groundwater pumping. The project is therefore unlikely to affect these springs and the bighorn sheep that use these water sources.

Closure/Decommissioning Impacts

Removal of facilities initially would have similar impacts to those described for construction. Reclamation of plant communities following closure and decommissioning may take decades. Because reestablishment of desert vegetative communities would be tong-term and ultimately may differ in composition than the pre-disturbance vegetative community, the altered vegetative communities could limit the ecosystem's ability to sustain the same density of bighorn sheep that currently seasonally utilize the site.

Beneficial Impacts

The Mitigated Ivanpah 3 Alternative would not provide any beneficial impacts to bighorn sheep.

4.3.2.3 Modified I-15 Alternative

Affected Environment

The environmental setting of the Modified I-15 Alternative, with respect to biological resources, would be similar to, but not exactly the same, as that described for the proposed project. While the location and biological resources associated with Ivanpah Units 1 and 2 would be the same as that of the proposed project, the location of Ivanpah Unit 3 would be reconfigured from northwest of Ivanpah Unit 2 to directly south of Ivanpah Unit 1, approximately four miles to the southeast. Because the location of this 1,227-acre area would be moved approximately 4 miles, the biological resources associated with Ivanpah Unit 3 would be different. At this time, detailed biological surveys of the reconfigured location have not been performed. However, based on the results of reconnaissance-level surveys, the relation of the location to the mountains, Ivanpah Dry Lake bed, Interstate 15 (I-15), and other factors, the following observations can be made regarding the biological resources associated with Ivanpah Unit 3:

- The Modified I-15 Alternative contains habitat of variable quality for desert tortoise, based on characteristics of the physical terrain, vegetation, and proximity to Interstate 15. The topography is flatter, there are fewer washes, and there are many dirt roads fragmenting the habitat. There are fewer desert tortoises and burrows within this alternative site, compared to the proposed project site. Biological resources within approximately 25% of the revised Ivanpah Unit 3 location are already impacted by the proximity of the highway. By co-locating with the highway, the reconfiguration of the Ivanpah Unit 3 site to the Modified I-15 Alternative location would decrease the total amount of tortoise habitat fragmentation.
- Reconfiguration of the Ivanpah Unit 3 site to the Modified I-15 Alternative site co-locates major facilities, while avoiding impacts to the northern portion of the proposed project area. As a consequence, movement corridors between mountainous areas would remain broad and relatively undisturbed. Human activities associated with the project would be less likely to adversely impact big game species, including desert bighorn sheep, as well as other species associated with mountainous habitats.
- Because the highway causes direct and indirect affects to other wildlife species (e.g., vehicle-wildlife collisions, lower habitat quality within the highway easement, noise, artificial lighting), co-location of the Ivanpah 3 site with I-15 would reduce adverse impacts to a number of wildlife species, while avoiding high quality habitat along the northern portion of the project area.
- While some of the habitat within the Modified I-15 Alternative is similar in quality to the original Ivanpah Unit 3 site, much of the alternative site's habitat located below 2,750-feet in elevation is less diverse and of lower quality than for the

proposed project. Although detailed biological surveys have not been conducted, it is anticipated that there would be fewer acres capable of sustaining rare plant communities, compared to the proposed project Ivanpah Unit 3 site.

Vegetation

Compared to the Ivanpah 3 site in the proposed project, the topography within the Modified I-15 Alternative is flatter, there are fewer washes, and there are many dirt roads fragmenting the habitat. A portion of the Modified I-15 Alternative is similar in quality to the original Ivanpah Unit 3 site, but much of the alternative site's habitat located below 2,750-feet in elevation is less diverse and of lower quality than for the proposed project. Although detailed surveys have not occurred on this proposed site, available information indicates that there would be a greater prevalence of noxious and invasive weeds at this site compared to the high quality habitat in the original Ivanpah 3 site.

Special Status Plant Species

Although detailed botanical surveys have not been conducted on the Modified I-15 Alternative site, available information indicates that there would be fewer acres capable of sustaining rare plant communities, compared to the proposed project Ivanpah Unit 3 site.

Wildlife

Because the topography is less varied and the vegetation is less diverse and of lower quality in the relocated Ivanpah 3 site associated with the Modified I-15 Alternative than for the proposed project, it is expected that the wildlife resources would be comparably less diverse and lower in densities than in the higher quality habitat found in the original Ivanpah 3 site.

Special Status Wildlife Species

Reptiles

Banded Gila Monster

Banded Gila monster has been observed primarily in desert scrub and semi-desert grasslands with rocky terrain and deeply incised topography (Lovich and Beaman 2007). The species has been found in lower mountain slopes, rocky bajadas, canyon bottoms, and arroyos. These habitat qualities are more characteristic of the original Ivanpah 3 site, than of the relocated Ivanpah 3 site associated with the Modified I-15 Alternative. Consequently, the Modified I-15 Alternative would disturb a reduced area of suitable habitat for banded Gila monster than the proposed project.

Desert Tortoise

Reconnaissance surveys of the relocated Ivanpah 3 site within the Modified I-15 Alternative found the area contains habitat of variable quality for desert tortoise, based on characteristics of the physical terrain, vegetation, and proximity to I-15. The topography is flatter, there are fewer washes, and there are many dirt roads fragmenting

the habitat. Preliminary reconnaissance surveys indicated that there are fewer desert tortoises and burrows within this alternative site, compared to the proposed project site.

Birds

Burrowing Owl, Loggerhead Shrike, Crissal thrasher, Bendire's thrasher, and Brewer's sparrow

Burrowing owl, loggerhead shrike, Crissal thrasher, and Brewer's sparrow were observed on the ISEGS site and suitable nesting and foraging habitat was identified. Loggerhead shrike, Crissal thrasher and Brewer's sparrow are likely to be year-round residents in the area. Brewer's sparrow, Crissal thrasher, and Bendire's thrasher prefer desert scrublands, which provide nesting habitat, protection from predators, and thermal cover. Loggerhead shrike often are associated with taller vegetation, such as yucca, which they use for nesting structure and protection from predators. Consequently, these species would have greater affinities for the high quality native habitat found at the original Ivanpah 3 site, rather than the relocated Ivanpah 3 site associated with the Modified I-15 Alternative.

The relocated Ivanpah 3 site associated with the Modified I-15 Alternative may provide better habitat for burrowing owls. These owls prefer fairly level terrain on desert floors with sparse vegetation.

Golden Eagle

No golden eagles are known to nest within the Modified I-15 Alternative site. Known nesting sites are several miles distant, but the site would be located within the foraging area of the nesting golden eagles. Because the original Ivanpah 3 site contains a great amount of higher quality habitat, it is anticipated that there is a greater prey base associated with that area, than with the Modified I-15 Alternative site.

Mammals

Special Status Bat Species

Pallid bat, long-legged myotis, and Townsend's big eared bats are likely to occur within the Modified I-15 Alternative area. However, the greater proportion of high quality habitat associated with the original Ivanpah 3 site is likely to support greater foraging opportunities than the area associated with the Modified I-15 Alternative. Since pallid bats may roost in rocky areas, there is a greater prevalence of potential roosting habitat in the original Ivanpah 3 site compared to the Modified I-15 Alternative site.

American Badger

The relocated Ivanpah 3 site associated with the Modified I-15 Alternative may provide better habitat for American badger. This species prefers friable soils located on fairly level terrain on desert floors with sparse vegetation. Given the large home range of this highly territorial species, the relocated Ivanpah 3 site could potentially support one or two individual badgers.

Nelson's Bighorn Sheep

Bighorn sheep are primarily associated with mountainous terrain located to the north of the project area, with seasonal use of alluvial fans as foraging habitat. Movement corridors between mountain ranges along rocky bajadas and lower mountain slopes may be critical to bighorn sheep populations. Local use of habitat is expected to primarily occur in high quality desert scrub habitats with rocky terrain and deeply incised topography. These habitat qualities are more characteristic of the original Ivanpah 3 site, than of the relocated Ivanpah 3 site associated with the Modified I-15 Alternative. Consequently, the Modified I-15 Alternative would provide less suitable foraging habitat for bighorn sheep as well as movement corridors than the proposed project.

4.3.2.3.1 Vegetation

Construction Impacts

The purpose of creating and evaluating the Modified I-15 Alternative was to reduce impacts to high quality native habitats and their associated wildlife resources. The Modified I-15 alternative would relocate the Ivanpah 3 site to an area close to I-15 that contains varying quality habitat. Topography is relatively flat over a substantial portion of the new area, the diversity and density of vegetation appears to be less than the original Ivanpah 3 site, and noxious and invasive weeds are more pervasive. Additionally, the new Ivanpah 3 site that would be co-located near I-15 contains 433 fewer acres than the original proposed project.

Construction-related impacts would be consistent with those described for the proposed project; however, the Mitigated Ivanpah 3 Alternative would result in 433 fewer acres of surface-disturbance activities compared to the proposed project.

As previously stated, the implementation of the Modified I-15 Alternative would result in the reduction of the project's surface disturbance footprint by 433 acres. Prior to construction, specified plants species within any project-related surface disturbance areas would be salvaged and relocated to the 7-acre Rare Plant Transplantation Area. The Rare Plant Transplantation Area would only be used for salvaged plant species of concern to reduce the amount of disturbance to salvaged plants should pre-construction surveys determine that remedial measures be needed. The 59-acre Succulent Nursery Area would be used for salvaged cacti and yucca species. Pending further consultation and BLM and Energy Commission review and concurrence, additional construction-related mitigation may be required.

To the maximum extent practical, plant species of concern located within the heliostat fields would be avoided and protected during construction through the use of fencing to avoid inadvertent encroachment. Fencing would be removed following construction and an alternative marking material (e.g., posts or stakes) would be installed to indicate the areas where avoided plants are located. The Modified I-15 Alternative would co-locate surface disturbance with I-15 and would provide greater ecological connectivity on the northern portion of the project area between adjacent areas of undisturbed contiguous habitat, allowing ecological processes such as seed dispersal and pollinator movement to occur. Monitoring of these extant plant species of concern within the heliostat fields would be conducted.

Operational Impacts

Operation-related impacts would be consistent with those described for the proposed project. However, the Modified I-15 Alternative would result in the elimination of 433 acres from inspection, repair, and maintenance activities compared to the proposed project. Direct and indirect impacts to plant communities and individual species from routine operational activities would be similar to those described for construction impacts. In addition, potential impacts to plant species from operational activities may include the loss of individuals as a result of shading caused by heliostat placement. To maintain the ground surface beneath the heliostats free of vegetation obstructions, operational mowing and weed control through the use of biological, mechanical, chemical, or various alternative methods may be conducted. As a result, sensitive CNPS plant species may be directly impacted by trampling, partial, or full removal as a result of vegetation maintenance and indirectly impacted as a result of altering potentially suitable habitat through changes in vegetation community cover and composition. Maintenance activities would increase vehicular traffic and increase the potential for dispersal of noxious and invasive weeds.

Closure/Decommissioning Impacts

Closure/decommissioning-related impacts to vegetation associated with the Modified I-15 Alternative would be consistent with those described within the proposed project. The Modified I-15 Alternative would have the 433 fewer acres requiring facility removal and subsequent reclamation activities as the proposed project. Direct and indirect impacts to biological resources from closure/decommissioning activities would be similar to those described for construction impacts. Reestablishment of desert vegetative communities would take decades and may differ in composition than the pre-disturbance vegetative community. Noxious and invasive weeds would likely be more prevalent than existing conditions. Permanent changes in the vegetative communities would alter the ecosystems ability to sustain the same type and numbers of species currently found at the site. Long-term restoration of the project area likely would result in a greater frequency of noxious and invasive weeds as well as lower density and diversity of native plant species, including sensitive plant species.

Compared to the proposed project, relocating the Ivanpah 3 site (i.e., the Modified I-15 Alternative) would impact fewer acres of land, and the site appears to generally contain lower densities of native vegetation and higher incidences of noxious and invasive weeds.

Beneficial Impacts

The Modified I-15 Alternative would not provide any beneficial impacts to plant communities.

4.3.2.3.2 Impacts to Special Status Plant Species

While botanical surveys have not been conducted within the footprint of Ivanpah Unit 3 in the Modified I-15 Alternative, the surveys did include the Ivanpah 1 and 2 sites in 2007 and 2008. In addition, reconnaissance-level surveys of the Ivanpah Unit 3 area in August 2009 found that the most suitable habitat for rare plants occurs in locations

above the 2,750-foot elevation contour, where vegetation diversity and microtopography improves and reflects the same species composition and structure associated with the ISEGS site rare plant occurrences. Below that elevation, the topography tends to flatten out, the habitat lacks the microtopography and soil textures upon which many rare plant species depend, and the overall plant diversity is reduced, with important indicators such as cacti and succulents dropping out of the species composition.

Rusby's Desert Mallow

Surveys of the Rusby's desert mallow conducted in 2007 and 2008 found widely-scattered distribution patterns throughout the project area, including the Ivanpah 1 and 2 sites. The surveys identified ten locations containing Rusby's desert mallow, of which two locations are within the proposed Ivanpah Unit 3 area. Because the available information indicates that rare plant habitat is of lesser quality at lower elevations, it is probable that the majority of Rusby's desert mallow locations (if any) would occur within the higher quality habitat located above 2,750-feet elevation, and therefore the Modified I-15 Alternative would result in lesser impacts to this species than the proposed project and Mitigated Ivanpah 3 Alternative.

Construction Impacts

Based on survey data and field reconnaissance information, construction activities likely would have reduced impacts to Rusby's desert mallow, compared to construction of the proposed project. Like the proposed project, plant avoidance and protection areas within the heliostat fields would be fenced during construction to avoid inadvertent encroachment. Dust from construction activities may stress plants within the construction area.

Construction-related impacts would be consistent with those described for the proposed project; however, the Modified I-15 Alternative would likely impact fewer locations with Rusby's desert mallow based on the rationale provided above. Potential impacts to these plant species from surface disturbance-related activities may include the loss of individuals as a result of crushing from construction vehicles and equipment. Because surface disturbance would be distributed over a relatively large geographic area and within an ecological-specific niche (i.e., Mojave Desert Ecoregion), population-level impacts to sensitive plant species may occur. Impacts may include the long-term loss of potentially suitable habitat until closure/decommissioning and native vegetation has been reestablished. Indirect impacts may include the introduction or spread of noxious weeds and invasive plant species. Noxious weed control through use of biological, mechanical, chemical, or various alternative methods may also indirectly impact species individuals and may alter potentially suitable habitat through changes in vegetation community cover and composition.

Operational Impacts

Fencing would be removed following construction and an alternative marking material (e.g., posts or stakes) would be installed for operations to indicate the areas where avoided plants are located. Rusby's desert mallow plant avoidance and protection areas within the heliostat fields would be monitored to ensure the areas remain protected.

Compared to the proposed project, the Modified I-15 Alternative is expected to impact fewer locations of Rusby's desert mallow during construction and operations. This assumption is based on the general distribution of these plants throughout the proposed project area. More occurrences of this species were identified north of the electrical transmission line separating Unit 1 from Units 2 and 3. This distribution suggests few locations of these rare plants would occur within the Modified I-15 Alternative site, but surveys would be required to confirm this assumption.

Closure/Decommissioning Impacts

Closure/decommissioning-related impacts associated with the Modified I-15 Alternative would be consistent with those described for construction. In addition, potential impacts to sensitive plant species from closure/decommissioning activities may include the loss of individuals during structure removal and subsequent revegetation. If biological, mechanical, chemical, or various alternative methods are used to control noxious weed species during closure, direct and indirect impacts may include partial or full plant removal and indirectly alter potentially suitable habitat through changes in vegetation community cover and composition.

Long-term restoration of the project area likely would result in a greater frequency of noxious and invasive weeds as well as lower density and diversity of native plant species, including sensitive plant species.

Beneficial Impacts

The Modified I-15 Alternative would not provide any beneficial impacts to special plant species.

4.3.2.3.3 Impacts to Wildlife

Construction Impacts

Wildlife resources and their habitats would be directly and indirectly impacted by the construction of the Modified I-15 Alternative. The types of impacts would be comparable to those described for the proposed project. The magnitude of the impacts is similar to those discussed for the Mitigated Ivanpah 3 Alternative, with 433 fewer acres impacted compared to the proposed project. Impacts to wildlife would likely be further reduced to the proximity of I-15. Impacts would vary by species, though the Modified I-15 Alternative is expected to support a lower diversity and density than the proposed project.

Operational Impacts

Operation impacts would be comparable to those described for the proposed project, except operations would affect 433 fewer acres. Impacts include increased noise, human presence, and light to the area. Sources of noise during operations would be mechanical, vehicle traffic, and maintenance facility noise. Maintenance activities would increase vehicular traffic and increase the potential for dispersal of noxious and invasive weeds. Artificial lighting associated with the facilities on wildlife species may include disorientation from and attraction to artificial light, impact-related mortality due to disorientation, and effects on the light-sensitive cycles of many species (Saleh 2007).

Because the I-15 corridor already causes many of these impacts, co-location would reduce the footprint of these impacts within the entire project area.

Direct impacts to big game include the incremental long-term reduction of potential forage and the incremental increase of habitat fragmentation, displacement of species from existing habitats, and hampering or restricting movements between seasonal ranges and/or water sources. Although habitats adjacent to the project may support some displaced animals, species that are at or near carrying capacity could suffer some increased mortalities due to displacement. Additionally, increased human presence and related increase in traffic levels on project access roads increases the potential for wildlife/vehicular collisions. Compared to the proposed project, the Modified I-15 Alternative would reduce habitat fragmentation by co-locating a portion of the project adjacent to the highway. The alternative would also maintain a broader big game movement corridor to the north of the project, as compared to the proposed project.

Direct and indirect impacts to MBTA species for construction would be similar to those impacts described for the proposed project, including loss of habitat quantity and quality, injuries and mortalities due to collisions and heat-induced injuries, potential impairment within movement corridors, mortality due to vehicle/bird collisions, and indirect impacts from construction and increased human activity levels.

<u>**Closure/Decommissioning Impacts**</u>

Closure/decommissioning-related impacts would be consistent with those described for the proposed project, except that the Modified I-15 Alternative would have the 433 fewer acres requiring facility removal and subsequent reclamation activities compared to the proposed project. Direct and indirect impacts to biological resources from closure/decommissioning activities would be similar to those described for construction impacts. Reestablishment of desert vegetative communities would take decades and may differ in composition than the pre-disturbance vegetative community. Noxious and invasive weeds would likely be more prevalent than existing conditions. Permanent changes in the vegetative communities would alter the ecosystems ability to sustain the same type and numbers of species currently found at the site.

<u>**Beneficial Impacts**</u>

The Modified I-15 Alternative would not provide any beneficial impacts to wildlife.

4.3.2.3.4 Impacts to Special Status Wildlife

<u>**Banded Gila Monster**</u>

Gila monsters were not detected during the 2007/2008 surveys, but this species is difficult to detect and cannot be assumed to be absent based on the absence of observations. If present within the project area, the relocation of the Ivanpah 3 site to be co-located near I-15 would preserve a greater proportion of potential banded Gila monster habitat. Additionally, the Modified I-15 Alternative would utilize 433 fewer acres of high quality habitat along the northern portion of the project area.

If Gila monsters are present they may be harmed during clearing, grading and trenching activities or may become entrapped within open trenches and pipes. Construction

activities could also result in direct mortality, injury, or harassment of individuals as a result of encounters with vehicles or heavy equipment. While relocation of banded Gila monster may temporarily remove the lizard from the construction area, this species shows high fidelity to its original site. Tortoise fencing may provide exclusion protection, though that has not been documented. Mitigation measure **BIO-11** requires that concurrent with the desert tortoise clearance survey, a biologist perform a preconstruction survey for Gila monsters in the project area, and implement appropriate impact avoidance and minimization measures if detected.

Construction of the Modified I-15 Alternative would disturb 3,640 acres that might provide cover, foraging, and breeding habitat for banded Gila monsters. Given that there were no banded Gila monster or sign identified during surveys and the difficulty surveying for this species, the presence of this species at the site cannot be confirmed. For this evaluation, the species is assumed to be present. Mitigation measure **BIO-17**, the compensatory mitigation plan, could offset the loss of habitat for this species, minimizing potential impact to the species.

Operational Impacts

Operational impacts would be comparable to those experienced by other reptiles within the project area as described above for wildlife resources. If present within the Modified I-15 Alternative area, adverse impacts to individual(s) are probable. Mitigation measure **BIO-17**, the compensatory mitigation plan, could offset the loss of habitat for this species.

Closure/Decommissioning Impacts

Removal of facilities initially would have similar impacts to those described for construction. Reclamation following closure and decommissioning may take decades. Because reestablishment of desert vegetative communities would take decades and may differ in composition than the pre-disturbance vegetative community, these permanent changes in the vegetative communities would alter the ecosystem's ability to sustain the same numbers of banded Gila monster that potentially currently occur at the site. Given the solitary and secretive habits of the banded Gila monster, impacts to individuals and the ability of any nearby populations to recolonize the site in the future is speculative.

Based on the low probability of occurrence within the site, the Modified I-15 Alternative would not likely adversely affect banded Gila monster.

Beneficial Impacts

The Modified I-15 Alternative would not provide any beneficial impacts to banded Gila monster.

Desert Tortoise

Construction Impacts

Construction impacts would be similar to those described for the proposed project and for general wildlife species above. Construction would cause surface disturbance of approximately 3,713 acres of occupied desert tortoise habitat.

Operational Impacts

Operation of the proposed project would permanently affect approximately 3,640 acres of potentially occupied desert tortoise habitat.

Subsequent to the publication of the DEIS, testimony from multiple expert witnesses indicated that tortoise densities may substantially decline with proximity to I-15 due to highway mortality, declining habitat quality, and habitat fragmentation. Thus, an alternative co-locating Ivanpah 3 with I-15 was examined to determine whether the alternative might reduce impacts to desert tortoise. Historical survey data extrapolated to this region (Berry 1984) suggest tortoise densities might be lower closer to the highway. Additional information provided by intervenors in their testimony associated with the Energy Commission certification process indicates a lower density of burrows in the Modified I-15 Alternative area than in other nearby habitats (Cashen 2010). This may be attributable to less desirable habitat, including flatter terrain occurring at a lower elevations, fewer washes, potential differences in burrow habitat, greater frequency of dirt roads, differences in forage quality (more weed species), and proximity to Interstate 15. Dr. Sanders with the CEC testified that I-15 creates a mortality hazard and increases habitat fragmentation. During Ms. Chainey-David's testimony (CEC staff), she emphasized the need for maintaining large portions of contiguous habitat.

Review of the scientific literature suggests there is a measurable impact on desert tortoises from highways that bisect their habitat. Boarman and Sazaki (2006) found statistically significant impacts to desert tortoise populations occur at distances less than 800 meters from a highway. Based on this highway-effect zone of 800 meters, the Modified I-15 Alternative would overlap with approximately 315 acres (equivalent to 25 percent) of habitat already impacted by the presence of I-15. Further, co-location with the highway would reduce local habitat fragmentation, providing larger, contiguous areas of tortoise habitat. Under the Modified I-15 Alternative, desert tortoises would be translocated from Ivanpah 1 and Ivanpah 2 and the Construction Logistics Area in the same manner as in the Mitigated Ivanpah 3 Alternative. Tortoises from the relocated Ivanpah 3 unit in this alternative would likely be translocated to the Mojave National Preserve because there are no caliche formations on the Ivanpah 3 unit in the Modified I-15 Alternative. Compared to the proposed project, the Modified I-15 Alternative likely would result in less mortality, based on presumed lower densities due to the highway's existing impacts. Surveys in 2007 and 2008 near the Modified I-15 Alternative area found only one tortoise; however, site-specific surveys have not been conducted for this project alternative. Based on the road-effect anticipated from the proximity of I-15, the Modified I-15 Alternative would have fewer anticipated impacts to desert tortoise than the proposed project.

The applicant also has identified mitigation to minimize impacts to desert tortoise due to the construction and operation of the proposed project, including conducting desert tortoise clearance surveys and establishing exclusionary fencing (**BIO-8**), developing and implementing a desert tortoise translocation plan (**BIO-9**), implementing avoidance measures and Best Management Practices (**BIO-11**), implementing raven and weed management plans (**BIO-12** and **BIO-13**), and acquiring off-site habitat, establishing endowment, and enhancing suitable desert tortoise habitat (**BIO-17**). The Modified I-15 would require a modification of **BIO-9**. Tortoises located in the new Ivanpah 3 location would be handled as described in the proposed proposed alternative wirth the exception of where they would be located. Instead of Ivanpah 3 tortoise being translocated west (as in the proposed project) or north (as in the Mitigated Ivanpah 3 Alternative), tortoises located within Ivanpah 3 would be translocated to the Mojave National Preserve, like tortoises from Ivanpah 1, Ivanpah 2, and the Construction Logistics Area. This translocation would occur in the Spring of 2011.

While no critical habitat for desert tortoise would be impacted by the Modified I-15 Alternative, the action is likely to adversely affect some individual desert tortoise and their habitat. This determination is based on the potential for incidental long-term loss of habitat from construction and operation, displacement of individuals, habitat fragmentation due to surface disturbance from the project, and the potential accidental loss of individuals from handling, tortoise relocation, and construction activities. Indirect impacts include an increase in noxious and invasive weeds which would reduce forage quality. Dust and increased human activity in the area would contribute to stress, possibly increasing susceptibility to disease. Similar to the proposed project, the Modified I-15 Alternative would require a federal endangered species “take” authorization.

Closure/Decommissioning Impacts

Closure and decommissioning activities would have similar types of impacts as construction. However, there would be 433 fewer acres that would require restoration compared to the proposed project. Reclamation following closure and decommissioning may take decades. Because reestablishment of desert vegetative communities would take decades and may differ in composition than the pre-disturbance vegetative community, these permanent changes in the vegetative communities would alter the ecosystem’s ability to sustain the same density of desert tortoise that currently occur at the site.

Beneficial Impacts

The Modified I-15 Alternative would not provide any beneficial impacts to desert tortoise.

4.3.2.3.5 Special Status Bird Species

Burrowing Owl, Loggerhead Shrike, Crissal thrasher, Bendire’s thrasher, and Brewer’s sparrow

Burrowing owl, loggerhead shrike, Crissal thrasher, and Brewer’s sparrow were observed on the ISEGS site and suitable nesting and foraging habitat was identified.

Loggerhead shrike, Crissal thrasher and Brewer's sparrow are likely to be year-round residents in the area. Bendire's thrasher was not identified during surveys but potential habitat exists within the site.

Construction Impacts

Construction activities would result in the disturbance of 4,073 acres of Mojave Desert habitat. If construction occurs during the breeding season, construction activities may result in the loss of active resident and migratory bird nests or young, a violation of the federal Migratory Bird Treaty Act and Fish and Game Code section 3503. The applicant has proposed mitigation measures to avoid and minimize impacts to nesting birds that have been incorporated into mitigation measures **BIO-11** (Impact Avoidance and Best Management Practices), **BIO-15** (Pre-construction Nest Surveys) and **BIO-16** (Burrowing Owl Avoidance and Impact Minimization Measures).

Implementation of the applicant-proposed mitigation measures, as well as the MBTA Conservation Agreement required in mitigation measure **BIO-22,** would avoid direct impacts to nests, eggs, or young of migratory birds, and would minimize the impacts of construction disturbance to nesting birds.

Operational Impacts

Impacts to these special status species would be similar to other bird species, as described in the General Wildlife section above. Long-term loss of nesting and foraging habitat for these special status bird species would adversely affect local populations of these species within the Ivanpah Valley. Project facilities may cause injuries and mortalities due to collisions, heat-related effects, and disorientation. As discussed in the cumulative impact section (Section 5), the Modified I-15 Alternative would substantially contribute to the cumulative loss of Ivanpah Valley's biological resources, including these special status bird species. Mitigation measure **BIO-17**, the compensatory mitigation plan, could offset the loss of habitat for these species.

Closure/Decommissioning Impacts

Removal of facilities initially would have similar impacts to those described for construction. Reclamation following closure and decommissioning may take decades. Because reestablishment of desert vegetative communities would take decades and may differ in composition than the pre-disturbance vegetative community, these permanent changes in the vegetative communities would alter the ecosystem's ability to sustain the same types and numbers of special status bird species that currently occur at the site.

Beneficial Impacts

The Modified I-15 Alternative would not provide any beneficial impacts to special status bird species.

<u>Golden Eagle</u>

Golden eagles are protected by the MBTA as well as the Bald Eagle and Golden Eagle Protection Act. The Alternative area is over 4 miles from the nearest active eagle nest,

so the construction, maintenance, and operation of the project is not expected to disturb the nesting eagles. Nevertheless, the project area is within the foraging distance for three eagle nests. The Modified I-15 Alternative would account for the loss of up to 3,640 acres of the foraging habitat available. This minimal amount of loss would not be considered large enough to affect the breeding success of eagles in the project vicinity.

There is a potential risk to birds from collisions with mirrors and towers or from burns from flying into the beam from heliostats to towers. The only study documenting bird collision and burning at a solar facility similar to the proposed project (McCrary et al. 1986) concluded that much of the bird mortality observed was due to an increased number of birds in the area resulting from adjacent evaporation ponds and agricultural fields that are not present in the vicinity of this project. Therefore, it is possible that the results of that study overestimate the magnitude of the impacts that could occur as a result of the proposed project. Because information regarding these impacts is limited, mitigation measure **BIO-23** would require the conduct of surveys to collect data on bird and bat mortality. Should adverse impacts to these species be identified as a result of those surveys, additional mitigation could be developed to address those impacts.

Operational Impacts

Operational impacts would be comparable to those experienced by other bird species within the project area. As discussed in Construction Impacts, golden eagles do not nest within the project area and while operation of the Modified I-15 Alternative would affect 3,270 acres, this loss would not substantially affect the overall amount of foraging habitat in the area. Operational impacts to golden eagles would be monitored and addressed as outlined in mitigation measure **BIO-28**.

Closure/Decommissioning Impacts

Removal of facilities initially would have similar impacts to those described for construction. Reclamation following closure and decommissioning may take decades. While reestablishment of desert vegetative communities would take decades and may differ in composition than the pre-disturbance vegetative community, the reclamation of project site would incrementally increase the amount of foraging habitat available to golden eagles in the region.

Beneficial Impacts

The Modified I-15 Alternative would not provide any beneficial impacts to golden eagles.

4.3.2.3.6 Impacts to Special Status Mammals

<u>**Special Status Bat Species**</u>

Construction Impacts

Pallid and Townsend's big-eared bats have been reported within the project area. Because pallid bats roost in rock crevices and trees as well as caves and mine shafts, the species may experience some loss of roosting habitat. Townsend's big-eared bats primarily roost in caves and mines, therefore construction activities would not impact roost sites for this species. Both species would experience loss of foraging habitat up to

3,640 acres associated with the construction of the Modified I-15 Alternative. Construction impacts to special status bats would be comparable to construction impacts for other bat species.

Operational Impacts

Operation of the Modified I-15 Alternative would result in the permanent loss of 3,270 acres of potential habitat for special status bat species. Operational impacts to these bat species would include loss of foraging and roosting habitat; collision with communications towers, transmission lines, and other elevated structures; risk of heat-related injuries attributable to the reflected and focus beams of solar radiation between the heliostats and the power towers; attraction to nighttime lighting; increased dust; increased noise and increased human activity that disrupts normal behavior; hazards within movement corridors, hampering normal movement between foraging habitat and water sources; and habitat fragmentation. Although habitats adjacent to the project may support some displaced animals, species that are at or near carrying capacity could suffer some increased mortality rates due to displacement.

Closure/Decommissioning Impacts

Removal of facilities initially would have similar impacts to those described for construction. Reclamation following closure and decommissioning may take decades. While reestablishment of desert vegetative communities would take decades and may differ in composition than the pre-disturbance vegetative community, the reclamation of project site would incrementally increase the amount of foraging habitat available to special status bat species in the region. The absence of structures would reduce injuries and fatalities due to collision and heat-related impacts.

Based on the low probability of occurrence on the project site, nighttime foraging patterns, and preferred roosting habitat located outside of the Ivanpah Unit 3 site, the Modified I-15 Alternative would have limited adverse effects on these bat species.

Beneficial Impacts

The Modified I-15 Alternative would not provide any beneficial impacts to special status bat species.

<u>American Badger</u>

Construction Impacts

American badgers were detected on the ISEGS site, and the Modified I-15 Alternative site includes suitable foraging and denning habitat for this species. The American badger is state-listed species, protected under Title 14, California Code of Regulations (sections 670.2 and 670.5).

Construction of the Modified I-15 Alternative would disturb 3,640 acres of potential American badger habitat. Based on home range sizes, the project site could potentially support three or more individuals. Construction activities could kill or injure American badgers by crushing with heavy equipment, or could bury them within a den, particularly

since badgers are nocturnal and undergo torpor in winter months. Construction activities could also result in disturbance or harassment of individuals.

Mitigation measure **BIO-11** requires that concurrent with the desert tortoise clearance survey, a qualified biologist would perform a preconstruction survey for badger dens in the project area, including areas within 250 feet of all project facilities, utility corridors, and access roads. If badgers are detected within the fenced Modified I-15 Alternative site during desert tortoise clearance surveys, the applicant shall develop and implement trapping and relocation plan in consultation with the Energy Commission staff and CDFG. Badgers are highly territorial, so displaced or relocated badgers could suffer some increased mortality rates due to displacement if surrounding areas or relocation sites are at carrying capacity.

Operational Impacts

The Modified I-15 Alternative would permanently remove approximately 3,270 acres of foraging and denning habitat for American badgers and would fragment and reduce the value of foraging and denning habitat adjacent to the project site. This habitat loss and degradation could adversely affect American badger populations within the Ivanpah Valley. However, compared to the proposed project, the preservation of the 433 acres of high quality habitat along the northern portion project area would maintain ecological connections to other nearby undisturbed habitats. As discussed in the cumulative impact section (Section 5), the Modified I-15 Alternative would substantially contribute to the cumulative loss of Ivanpah Valley's biological resources, including American badgers. Mitigation measure **BIO-17**, the compensatory mitigation plan, could offset the loss of habitat for this species.

Closure/ Decommissioning Impacts

Removal of facilities initially would have similar impacts to those described for construction. Reclamation of plant communities following closure and decommissioning may take decades. Because reestablishment of desert vegetative communities would be tong-term and ultimately may differ in composition than the pre-disturbance vegetative community, the altered vegetative communities could limit the ecosystem's ability to sustain the same density of American badger that currently occur at the site.

Beneficial Impacts

The Modified I-15 Alternative would not provide any beneficial impacts to American badger.

Nelson's Bighorn Sheep

Construction Impacts

In general, bighorn sheep primarily occupy mountainous terrain for habitat, using alluvial fans and washes as seasonal foraging habitat and mountain valleys as movement corridors between mountain ranges. Nelson's bighorn sheep are known to occur in the nearby Clark Mountains, and could use the ISEGS project site as foraging habitat and possibly as a migratory corridor (CDFG 2008b). However, the AFC (CH2M Hill 2007) does not provide sufficient project-specific information on use of the site by Nelson's

bighorn sheep to identify specific areas that might provide foraging habitat or movement corridors, nor are studies available detailing use of the Ivanpah Valley by bighorn sheep.

Operational Impacts

One of the primary objectives of the Modified I-15 Alternative was to maintain a wide movement corridor on the north side of the project area for big game between Clark Mountain and the Stateline Hills. Further the Modified I-15 Alternative would increase the availability of seasonal forage for Nelson's bighorn sheep on the alluvial fan, even though the project area represents a small fraction of the total available habitat. Modified I-15 Alternative would reduce direct and indirect impacts associated with human encroachment, such as increased stress from dust and human activity. Stress has been shown to increase frequency of disease in some populations. Loss of surface water sources also may diminish the viability of existing populations (Wehausen 2005). These direct and indirect impacts would contribute to the cumulative impacts to bighorn sheep in the eastern Mojave Desert.

Implementation of mitigation measure **BIO-19** would create a new water source in the eastern part of the Clark Mountain range or in the State Line Hills outside of designated wilderness. This artificial water source would supplement existing supplies that may be a limiting factor to local bighorn sheep populations. Further, the water source likely would shift foraging opportunities into other areas within the lower elevations of the mountains, and away from areas of the bajada lost to ISEGS facilities and the zone of disturbance on the north. This water source would also serve to attract the bighorn during seasonal movements and keep them in the mountainous portion of the wildlife corridor.

The CDFG (CDFG 2008b) and others (SCBH 2009a, DOW 2008, 2009a) expressed concerns regarding potential impacts of the ISEGS wells and groundwater pumping on springs used by bighorn sheep. The proposed project includes the installation of two groundwater wells east of Ivanpah 2. Water consumption for all three phases of all three projects is estimated at less than 100 acre-feet/year for the 50-year life of the project (CH2M Hill 2007 p. 5.5-17). This level of pumping, combined with all other projects, is not expected to substantially affect overall groundwater recharge in the Ivanpah Valley (CH2M Hill 2007 p. 5.15-20). Section 4.10 provides an analysis of this issue, and concludes that the seeps and springs located in the Clark Mountain are ephemeral and located upgradient and over three miles away from the project's proposed pumping wells. The seeps and springs derive their water from precipitation further upgradient in the Clark Mountains and beyond the potential reach of any cone of depression that would result from the project's proposed groundwater pumping. The project is therefore unlikely to affect these springs and the bighorn sheep that use these water sources.

Closure/Decommissioning Impacts

Removal of facilities initially would have similar impacts to those described for construction. Reclamation of plant communities following closure and decommissioning may take decades. Because reestablishment of desert vegetative communities would be tong-term and ultimately may differ in composition than the pre-disturbance

vegetative community, the altered vegetative communities could limit the ecosystem's ability to sustain the same density of bighorn sheep that currently seasonally utilize the site.

Since the relocated Ivanpah Unit 3 site is furthest north, the relocation of that unit away from Clark Mountain, closer to the Dry Lake bed and adjacent to I-15 would reduce potential impacts to bighorn sheep and other big game movement corridors. Consequently, the Modified I-15 Alternative would have reduced impacts on desert bighorn sheep compared to the proposed project.

Beneficial Impacts

The Modified I-15 Alternative would not provide any beneficial impacts to bighorn sheep.

4.3.2.4 No Action Alternative

The No Action Alternative is an alternative in which the BLM would not approve the ROW easement or the CDCA Plan amendment, as a result, the project would not be undertaken. Under this alternative, the BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Action Alternative to vegetation and biological resources would be the following:

- The impacts of the proposed project to biological resources, including desert tortoise and special status plant and wildlife species, and ephemeral drainages would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, and the site could potentially be considered for another solar project.
- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If this project is not approved, renewable projects would likely be developed on this and other sites in the Mojave Desert, or in adjacent states, as developers strive to provide renewable power that complies with utility requirements and state/federal mandates.

4.3.3 Mitigation Measures

Designated Biologist Selection and Qualifications[13]

BIO-1 The project owner shall assign at least one Designated Biologist to the project. The project owner shall submit the resume of the proposed Designated Biologist(s), with at least three references and contact information, to the Energy Commission Compliance project Manager (CPM) and BLM's Authorized Officer for approval in consultation with CDFG and USFWS.

The Designated Biologist must meet the following minimum qualifications:

1. Bachelor's degree in biological sciences, zoology, botany, ecology, or a closely related field;
2. Three years of experience in field biology or current certification of a nationally recognized biological society, such as The Ecological Society of America or The Wildlife Society;
3. Have at least one year of field experience with biological resources found in or near the project area;
4. Meet the current USFWS Authorized Biologist qualifications criteria (USFWS 2008a), demonstrate familiarity with protocols and guidelines for the desert tortoise, and be approved by the USFWS; and
5. Possess a California ESA Memorandum of Understanding pursuant to Section 2081(a) for desert tortoise.

In lieu of the above requirements, the resume shall demonstrate to the satisfaction of the CPM and BLM's Authorized Officer, in consultation with CDFG and USFWS, that the proposed Designated Biologist or alternate has the appropriate training and background to effectively implement the conditions of certification.

<u>**Verification:**</u> The project owner shall submit the specified information at least 90 days prior to the start of any project-related site disturbance activities. No site or related facility activities shall commence until an approved Designated Biologist is available to be on site.

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[13] USFWS <www.fws.gov/ventura/speciesinfo/protocols_guidelines/docs/dt> designates biologists who are approved to handle tortoises as "Authorized Biologists." Such biologists have demonstrated to USFWS that they possess sufficient desert tortoise knowledge and experience to handle and move tortoises appropriately, and have received USFWS approval. Authorized Biologists are permitted to then approve specific monitors to handle tortoises, at their discretion. The California Department of Fish and Game (CDFG) must also approve such biologists, potentially including individual approvals for monitors approved by the Authorized Biologist. Designated Biologists are the equivalent of Authorized Biologists. Only Designated Biologists and certain Biological Monitors who have been approved by the Designated Biologist would be allowed to handle desert tortoises.

If a Designated Biologist needs to be replaced, the specified information of the proposed replacement must be submitted to the CPM and BLM's Authorized Officer at least 10 working days prior to the termination or release of the preceding Designated Biologist. In an emergency, the project owner shall immediately notify the CPM and BLM Authorized Officer to discuss the qualifications and approval of a short-term replacement while a permanent Designated Biologist is proposed to the CPM and BLM's Authorized Officer for consideration.

Designated Biologists shall complete a USFWS Qualifications Form (USFWS 2008a) (www.fws.gov/ventura/speciesinfo/protocols_guidelines) and submit it to the USFWS, CPM, and BLM's Authorized Officer within 60 days prior to ground breaking for review and final approval.

Designated Biologist Duties

BIO-2 The project owner shall ensure that the Designated Biologist performs the following during any site (or related facilities) mobilization, ground disturbance, grading, construction, operation, and closure activities. The Designated Biologist may be assisted by the approved Biological Monitor(s) but remains the contact for the project owner and the CPM and BLM's Authorized Officer. The Designated Biologist Duties shall include the following:

1. Advise the project owner's Construction and Operation Managers on the implementation of the biological resources conditions of certification;
2. Consult on the preparation of the Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) to be submitted by the project owner;
3. Be available to supervise, conduct and coordinate mitigation, monitoring, and other biological resources compliance efforts, particularly in areas requiring avoidance or containing sensitive biological resources, such as special-status species or their habitat;
4. Clearly mark sensitive biological resource areas and inspect these areas at appropriate intervals for compliance with regulatory terms and conditions;
5. Inspect active construction areas where animals may have become trapped prior to construction commencing each day. At the end of the day, inspect for the installation of structures that prevent entrapment or allow escape during periods of construction inactivity. Periodically inspect areas with high vehicle activity (e.g., parking lots) for animals in harm's way;
6. Notify the project owner and the CPM and BLM's Authorized Officer of any non-compliance with any biological resources condition of certification;
7. Respond directly to inquiries of the CPM and BLM's Authorized Officer regarding biological resource issues;

8. Maintain written records of the tasks specified above and those included in the BRMIMP. Summaries of these records shall be submitted in the Monthly Compliance Report and the Annual Compliance Report;
9. Train the Biological Monitors as appropriate, and ensure their familiarity with the BRMIMP, Worker Environmental Awareness Program (WEAP) training, and USFWS guidelines on desert tortoise surveys and handling procedures <www.fws.gov/ventura/speciesinfo/protocols_guidelines>; and
10. Maintain the ability to be in regular, direct communication with representatives of CDFG, USFWS, the CPM and BLM's Authorized Officer, including notifying these agencies of dead or injured listed species and reporting special-status species observations to the California Natural Diversity Data Base.

Verification: The Designated Biologist shall submit in the Monthly Compliance Report to the CPM and BLM's Authorized Officer and copies of all written reports and summaries that document biological resources compliance activities. If actions may affect biological resources during operation a Designated Biologist shall be available for monitoring and reporting. During project operation, the Designated Biologist shall submit record summaries in the Annual Compliance Report unless his/her duties cease, as approved by the CPM and BLM's Authorized Officer.

Biological Monitor Selection and Qualifications

BIO-3 The project owner's BLM and CPM-approved Designated Biologist shall submit the resume, at least three references, and contact information of the proposed Biological Monitors to the CPM and BLM's Authorized Officer. The resume shall demonstrate, to the satisfaction of the CPM and BLM's Authorized Officer, the appropriate education and experience to accomplish the assigned biological resource tasks. The Biological Monitor is the equivalent of the USFWS-designated Desert Tortoise Monitor (USFWS 2008a).

Biological Monitor(s) training by the Designated Biologist shall include familiarity with the conditions of certification, BRMIMP, WEAP, USFWS guidelines on desert tortoise surveys and handling procedures <www.fws.gov/ventura/speciesinfo/protocols_guidelines>.

Verification: The project owner shall submit the specified information to the CPM and BLM's Authorized Officer for approval at least 30 days prior to the start of any project-related site disturbance activities. The Designated Biologist shall submit a written statement to the CPM and BLM's Authorized Officer confirming that individual Biological Monitor(s) has been trained including the date when training was completed. If additional biological monitors are needed during construction the specified information shall be submitted to the CPM and BLM's Authorized Officer for approval at least 10 days prior to their first day of monitoring activities.

Biological Monitor Duties

BIO-4 The Biological Monitors shall assist the Designated Biologist in conducting surveys and in monitoring of mobilization, ground disturbance, grading, construction, operation, and closure activities. The Designated Biologist shall remain the contact for the project owner and the CPM and BLM's Authorized Officer.

Verification: The Designated Biologist shall submit in the Monthly Compliance Report to the CPM and BLM's Authorized Officer and copies of all written reports and summaries that document biological resources compliance activities, including those conducted by Biological Monitors. If actions may affect biological resources during operation a Biological Monitor, under the supervision of the Designated Biologist, shall be available for monitoring and reporting. During project operation, the Designated Biologist shall submit record summaries in the Annual Compliance Report unless their duties cease, as approved by the CPM and BLM's Authorized Officer.

Designated Biologist and Biological Monitor Authority

BIO-5 The project owner's construction/operation manager shall act on the advice of the Designated Biologist and Biological Monitor(s) to ensure conformance with the biological resources conditions of certification.

The Designated Biologist shall have the authority to immediately stop any activity that is not in compliance with these conditions and/or order any reasonable measure to avoid take of an individual of a listed species. If required by the Designated Biologist and Biological Monitor(s) the project owner's construction/operation manager shall halt all site mobilization, ground disturbance, grading, construction, and operation activities in areas specified by the Designated Biologist. The Designated Biologist shall:

1. Require a halt to all activities in any area when determined that there would be an unauthorized adverse impact to biological resources if the activities continued;
2. Inform the project owner and the construction/operation manager when to resume activities; and
3. Notify the CPM and BLM's Authorized Officer if there is a halt of any activities and advise them of any corrective actions that have been taken or will be instituted as a result of the work stoppage.

If the Designated Biologist is unavailable for direct consultation, the Biological Monitor shall act on behalf of the Designated Biologist.

Verification: The project owner shall ensure that the Designated Biologist or Biological Monitor notifies the CPM and BLM's Authorized Officer immediately (and no later than the morning following the incident, or Monday morning in the case of a weekend) of any non-compliance or a halt of any site mobilization, ground disturbance, grading, construction, and operation activities. The project owner shall notify the CPM and BLM's Authorized Officer of the circumstances and actions being taken to resolve the problem.

Whenever corrective action is taken by the project owner, a determination of success or failure will be made by the CPM and BLM's Authorized Officer within five working days after receipt of notice that corrective action is completed, or the project owner will be notified by the CPM and BLM's Authorized Officer that coordination with other agencies will require additional time before a determination can be made.

Worker Environmental Awareness Program (WEAP)

BIO-6 The project owner shall develop and implement an Ivanpah SEGS-specific WEAP and shall secure approval for the WEAP from the CPM and BLM's Authorized Officer. The USFWS and CDFG shall also be provided a copy of the WEAP for review and comment. The WEAP shall be administered to all onsite personnel including surveyors, construction engineers, employees, contractors, contractor's employees, supervisors, inspectors, subcontractors, and delivery personnel. The WEAP shall be implemented during site mobilization, ground disturbance, grading, construction, operation, and closure. The WEAP shall:

1. Be developed by or in consultation with the Designated Biologist and consist of an on-site or training center presentation in which supporting written material and electronic media, including photographs of protected species, is made available to all participants;
2. Discuss the locations and types of sensitive biological resources on the project site and adjacent areas, and explain the reasons for protecting these resources; provide information to participants that Gila monsters are venomous and should not be handled, and that no snakes, reptiles, or other wildlife shall be harmed;
3. Place special emphasis on desert tortoise, including information on physical characteristics, distribution, behavior, ecology, sensitivity to human activities, legal protection, penalties for violations, reporting requirements, and protection measures;
4. Include a discussion of fire prevention measures to be implemented by workers during project activities; request workers dispose of cigarettes and cigars appropriately and not leave them on the ground or buried;
5. Present the meaning of various temporary and permanent habitat protection measures;
6. Identify whom to contact if there are further comments and questions about the material discussed in the program; and
7. Include a training acknowledgment form to be signed by each worker indicating that they received training and shall abide by the guidelines.

The specific program can be administered by a competent individual(s) acceptable to the Designated Biologist.

<u>**Verification:**</u> At least 60 days prior to the start of any project-related site disturbance activities, the project owner shall provide to the CPM and BLM's Authorized

Officer a copy of the draft WEAP and all supporting written materials and electronic media prepared or reviewed by the Designated Biologist and a resume of the person(s) administering the program.

The project owner shall provide in the Monthly Compliance Report the number of persons who have completed the training in the prior month and a running total of all persons who have completed the training to date. At least 10 days prior to site and related facilities mobilization, the project owner shall submit two copies of the CPM and BLM-approved final WEAP.

Training acknowledgement forms signed during construction shall be kept on file by the project owner for at least six months after the start of commercial operation.

Throughout the life of the project, the worker education program shall be repeated annually for permanent employees, and shall be routinely administered within one week of arrival to any new construction personnel, foremen, contractors, subcontractors, and other personnel potentially working within the project area. Upon completion of the orientation, employees shall sign a form stating that they attended the program and understand all protection measures. These forms shall be maintained by the project owner and shall be made available to the CPM and BLM's Authorized Officer upon request. Workers shall receive and be required to visibly display a hardhat sticker or certificate that they have completed the training.

During project operation, signed statements for operational personnel shall be kept on file for six months following the termination of an individual's employment.

Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP)

BIO-7 The project owner shall develop a BRMIMP and submit two copies of the proposed BRMIMP to the CPM and BLM-Authorized Officer for review and approval and shall implement the measures identified in the approved BRMIMP. The BRMIMP shall incorporate avoidance and minimization measures described in final versions of the Desert Tortoise Translocation Plan, the Raven Management Plan, the Closure, Revegetation and Rehabilitation Plan, the Burrowing Owl Mitigation and Monitoring Plan, the Weed Management Plan, and the Special-Status Plant Remedial Action Plan.

The BRMIMP shall be prepared in consultation with the Designated Biologist and include the following:

1. All biological resources mitigation, monitoring, and compliance measures proposed and agreed to by the project owner;
2. All biological resources conditions of certification identified as necessary to avoid or mitigate impacts;
3. All biological resource mitigation, monitoring and compliance measures required in federal agency terms and conditions, such as those provided in the USFWS Biological Opinion;
4. All sensitive biological resources to be impacted, avoided, or mitigated by project construction, operation, and closure;

5. All required mitigation measures for each sensitive biological resource;
6. A detailed description of measures that shall be taken to avoid or mitigate temporary disturbances from construction activities;
7. All locations on a map, at an approved scale, of sensitive biological resource areas subject to disturbance and areas requiring temporary protection and avoidance during construction and operation;
8. Aerial photographs, at an approved scale, of all areas to be disturbed during project construction activities; include one set prior to any site or related facilities mobilization disturbance and one set subsequent to completion of project construction. Provide planned timing of aerial photography and a description of why times were chosen. Provide a final accounting of the before/after acreages and a determination of whether additional habitat compensation is necessary in the Construction Termination Report;
9. Duration for each type of monitoring and a description of monitoring methodologies and frequency;
10. Performance standards to be used to help decide if/when proposed mitigation is or is not successful;
11. All performance standards and remedial measures to be implemented if performance standards are not met;
12. A discussion of biological resources-related facility closure measures including a description of funding mechanism(s); and
13. A process for proposing plan modifications to the CPM and BLM's Authorized Officer and appropriate agencies for review and approval.

<u>**Verification:**</u> The project owner shall submit the BRMIMP to the CPM and BLM Authorized Officer at least 60 days prior to start of any project-related site disturbance activities. The BRMIMP shall contain all of the required measures included in all biological Conditions of Certification. No ground disturbance may occur prior to approval of the final BRMIMP by the CPM and BLM's Authorized Officer.

The CPM and BLM's Authorized Office, in consultation with other appropriate agencies, will determine the BRMIMP's acceptability within 45 days of receipt. If there are any permits that have not yet been received when the BRMIMP is first submitted, these permits shall be submitted to the CPM and BLM's Authorized Officer within five days of their receipt, and the BRMIMP shall be revised or supplemented to reflect the permit condition within at least 10 days of their receipt by the project owner. Ten days prior to site and related facilities mobilization the revised BRMIMP shall be resubmitted to the CPM and BLM's Authorized Officer.

The project owner shall notify the CPM and BLM's Authorized Officer no less than five working days before implementing any modifications to the approved BRMIMP to obtain the CPM and BLM's Authorized Officer.

Any changes to the approved BRMIMP must also be approved by the CPM and BLM's Authorized Officer in consultation with appropriate agencies to ensure no conflicts exist.

Implementation of BRMIMP measures (construction activities that were monitored, species observed) will be reported in the Monthly Compliance Reports by the Designated Biologist. Within 30 days after completion of project construction, the project owner shall provide to the CPM and BLM's Authorized Officer, for review and approval, a written construction termination report identifying which items of the BRMIMP have been completed, a summary of all modifications to mitigation measures made during the project's site mobilization, ground disturbance, grading, and construction phases, and which mitigation and monitoring items are still outstanding.

Desert Tortoise Clearance Surveys and Fencing

BIO-8 The project owner shall undertake appropriate measures to manage the construction site and related facilities in a manner to avoid or minimize impacts to desert tortoise. Methods for clearance surveys, fence installation, tortoise handling, artificial burrow construction, egg handling and other procedures would be consistent with those described in the *Guidelines for Handling Desert Tortoise During Construction Projects* (Desert Tortoise Council 1999) or more current guidance provided by CDFG and USFWS. The project owner shall also implement all terms and conditions described in the Biological Opinion prepared by USFWS. These measures include, but are not limited to, the following:

1. <u>Fence Installation</u>. To avoid impacts to desert tortoises the proposed fence alignment shall be flagged and the alignment surveyed within 24 hours prior to the initiation of construction of tortoise-exclusion fence. Surveys shall be conducted by the Designated Biologist(s) using techniques approved by the USFWS and CDFG. Biological Monitors may assist the Designated Biologist under his or her supervision. These surveys shall provide 100-percent coverage of all areas to be disturbed and an additional transect along both sides of the fence line. This fence line transect will cover an area approximately 90 feet wide centered on the fence alignment. Transects would be no greater than 30 feet apart. All desert tortoise burrows, and burrows constructed by other species that might be used by desert tortoises, shall be examined to assess occupancy of each burrow by desert tortoises and handled in accordance with USFWS-approved protocol.
2. <u>Fence Installation</u>. Prior to the initiation of construction activities for each solar plant, the project owner shall enclose the boundary of the affected solar plant with permanent chain-link fencing for security purposes and permanent desert tortoise exclusionary fencing would be attached to the bottom of the chain link fencing. The fence installation shall be supervised by the Designated Biologist and monitored by the Biological Monitors to ensure the safety of any tortoise present.
    a. <u>Fence Material and Installation</u>. The permanent tortoise exclusionary fencing shall consist of galvanized hard wire cloth 1-inch by 2-inch

mesh sunk 12 inches into the ground, and 24 inches above the ground (but not less than 18 inches above the ground) (USFWS 2008a). The fencing shall be buried approximately 6 inches below ground or bent at a right angle towards the outside of the project site and covered with dirt, rocks or gravel to discourage the tortoise from digging under the fence

b. Security Gates. Security gates shall be designed with minimal ground clearance to deter ingress by tortoises. The gates may be electronically activated to open and close immediately after the vehicle(s) have entered or exited to prevent the gates from being kept open for long periods of time. Cattle grating designed to safely exclude desert tortoise shall be installed at the gated entries to discourage tortoises from gaining entry.

c. Utility Corridor Fencing. The utility rights-of-way shall be temporarily fenced on each side of the right-of-way prior to ground disturbing activities to prevent desert tortoise entry during construction. Temporary fencing must be capable of preventing desert tortoises from entering the work area, with supporting stakes sufficiently spaced to maintain fence integrity. The Designated Biologist or Biological Monitor shall be present to supervise all construction activities occurring within areas bounded by temporary fencing.

d. Fence Inspections. Following installation of the desert tortoise exclusion fencing for both the permanent site fencing and temporary fencing in the utility corridors, the fencing shall be regularly inspected. Permanent fencing shall be inspected monthly and during/following all major rainfall events. Any damage to the fencing shall be temporarily repaired immediately to keep tortoises out of the site, and permanently repaired within two days of observing damage. Inspections of permanent site fencing shall occur for the life of the project. Temporary fencing must be inspected weekly and, where drainages intersect the fencing, during and immediately following major rainfall events. All temporary fencing shall be repaired immediately upon discovery and, if the fence may have permitted tortoise entry while damaged, the Designated Biologist shall inspect the area for tortoise.

3. Clearance Surveys. Following construction of the security fence and the attached tortoise exclusion fence, the fenced area shall be cleared of tortoises by Biological Monitors under the supervision of the Designated Biologist. Two complete passes with complete coverage shall be conducted as described above. If a desert tortoise is located on the second survey, a third survey would be conducted. Transects would be no wider than 30 feet. Each separate survey would be walked in a different direction to allow opposing angles of observation. Vegetation salvage operations shall not begin until the area is deemed free of desert tortoises.

4. Burrow Searches. During clearance surveys all potential desert tortoise burrows within the fenced area shall be inspected to determine if tortoises are present. In some cases, a fiber optic scope may be needed to determine presence or absence within a deep burrow. To prevent reentry by a tortoise or other wildlife, all burrows shall be collapsed once absence has been determined. Tortoises taken from burrows and from elsewhere on the site shall be relocated or translocated as described in the Desert Tortoise Relocation/Translocation Plan.
5. Burrow Excavation/Handling. All potential desert tortoise burrows located would be excavated by hand by a Biological Monitor, tortoises removed, and collapsed or blocked to prevent occupation by desert tortoises. Burrows inhabited by tortoises shall be excavated using hand tools under the supervision of the Designated Biologist. If excavated during May through July, the Biological Monitor would search for desert tortoise nests/eggs, which are typically located near the entrance to burrows. All desert tortoise handling and removal, and burrow excavations, including nests, would be conducted by the Designated Biologist or a Biological Monitor in accordance with the USFWS-approved protocol (Desert Tortoise Council 1994, revised 1999). If the Desert Tortoise Council releases a revised protocol for handling of desert tortoises before initiation of project activities, the revised protocol would be implemented for the project.
6. Monitoring During Clearing. Following the tortoise clearance and translocation, workers and heavy equipment shall be allowed to enter the project site to perform vegetation salvage and earth work such as clearing, grubbing, leveling, trenching, and installation of heliostats. A Biological Monitor shall monitor clearing and grading activities to find and move tortoises missed during the initial tortoise clearance survey. Should a tortoise be discovered, it shall be relocated or translocated as described in the Desert Tortoise Relocation/Translocation Plan to an area approved by the Designated Biologist.
7. Reporting. The Designated Biologist shall record the following information for any desert tortoises handled: a) the locations (narrative and maps) and dates of observation; b) general condition and health, including injuries, state of healing and whether desert tortoise voided their bladders; c) location moved from and location moved to (using GPS technology); d) gender, carapace length, and diagnostic markings (i.e., identification numbers or marked lateral scutes); e) ambient temperature when handled and released; and f) digital photograph of each handled desert tortoise as described in the paragraph below. Desert tortoise moved from within project areas shall be marked for future identification as described in *Guidelines for Handling Desert Tortoise during Construction Projects* (Desert Tortoise Council 1999) or more current guidance on the USFWS website. Digital photographs of the carapace, plastron, and fourth costal scute shall be taken. Scutes shall not be notched for identification.

Verification: All mitigation measures and their implementation methods shall be included in the BRMIMP and implemented. Implementation of the measures shall be reported in the Monthly Compliance Reports by the Designated Biologist. Within 30 days after completion of desert tortoise clearance surveys the Designated Biologist shall submit a report to the CPM, BLM's Authorized Officer, USFWS, and CDFG describing how each of the mitigation measures described above has been satisfied. The report shall include the desert tortoise survey results, capture and release locations of any relocated desert tortoises, and any other information needed to demonstrate compliance with the measures described above.

Desert Tortoise Translocation Plan

BIO-9 The project owner shall develop and implement a final Desert Tortoise Relocation/Translocation Plan (Plan) that is consistent with current USFWS approved guidelines, and meets the approval of the CPM, BLM's Authorized Officer, and USFWS, in consultation with CDFG. The final Plan shall be based on the draft Desert Tortoise Relocation/Translocation Plan prepared by the applicant dated May 2009, and modifications to this plan identified in the BA amendment dated June 21, 2010, and shall include all revisions deemed necessary by the CPM, BLM's Authorized Officer, and USFWS, in consultation with CDFG. Translocation of tortoise into the Mojave National Preserve will require fencing of roads within 10 km (6.2 miles) of receptor sites. Since this fencing is required as part of the translocation, it would not count towards the fencing identified in BIO-17, desert tortoise compensatory mitigation.

Verification: Within 60 days of publication of the Energy Commission Decision and BLM Record of Decision the project owner shall provide the CPM and BLM's Authorized Officer with the final version of a Desert Tortoise Relocation/Translocation Plan that has been reviewed by BLM, USFWS, CDFG, and Energy Commission staff. The CPM and BLM's Authorized Officer will determine the plan's acceptability within 15 days of receipt of the final plan. All modifications to the approved translocation must be made only after consultation with the CPM, BLM's Authorized Officer, and USFWS, in consultation with CDFG.

Within 30 days after initiation of translocation activities, the Designated Biologist shall provide to the CPM and BLM's Authorized Officer for review and approval, a written report identifying which items of the Plan have been completed, and a summary of all modifications to measures made during implementation of the Plan.

Desert Tortoise Compliance Verification

BIO-10 The project owner shall provide Energy Commission and BLM representatives with reasonable access to the project site and mitigation lands under the control of the project owner and shall otherwise fully cooperate with the Energy Commission's and BLM's efforts to verify the project owner's compliance with, or the effectiveness of, mitigation measures set forth in the conditions of certification. The project owner shall hold the Designated Biologist, the Energy Commission, and BLM harmless for any

costs the project owner incurs in complying with the management measures, including stop work orders issued by the CPM and BLM's Authorized Officer or the Designated Biologist. The Designated Biologist shall do all of the following:

1. Notify the CPM and BLM's Authorized Officer and at least 14 calendar days before initiating vegetation salvage or ground-disturbing activities;
2. Immediately notify the CPM and BLM's Authorized Officer in writing if the project owner is not in compliance with any conditions of certification, including but not limited to any actual or anticipated failure to implement mitigation measures within the time periods specified in the conditions of certification;
3. Remain onsite daily while vegetation salvage, grubbing, grading and heliostat installation activities are taking place to avoid or minimize take of listed species, to check for compliance with all impact avoidance and minimization measures, and to check all exclusion zones to ensure that signs, stakes, and fencing are intact and that human activities are restricted in these protective zones.
4. Maintain and check desert tortoise exclusion fences on a daily basis to ensure the integrity of the fence is maintained. The Designated Biologist shall be present onsite to monitor construction and determine fence placement during fence installation.
5. Conduct compliance inspections at a minimum of once per month after clearing, grubbing, grading, and heliostat installation activities are completed and submit a monthly compliance report to the CPM and BLM's Authorized Officer;
6. No later than January 31 of every year the ISEGS facility remains in operation, provide the CPM and BLM's Authorized Officer an annual Listed Species Status Report, which shall include, at a minimum: 1) a general description of the status of the project site and construction activities, including actual or projected completion dates, if known; 2) a copy of the table in the BRMIMP with notes showing the current implementation status of each mitigation measure; and 3) an assessment of the effectiveness of each completed or partially completed mitigation measure in minimizing and compensating for project impacts;
7. Ensure that all observations of listed species and their sign during project activities are reported to the Designated Biologist for inclusion in the next monthly compliance report submitted to the CPM and BLM's Authorized Officer;
8. No later than 45 days after the first sale of power, provide the CPM and BLM's Authorized Officer a Final Listed Species Mitigation Report that shall include, at a minimum: 1) a copy of the table in the BRMIMP with notes showing when each of the mitigation measures was implemented; 2) all available information about project-related incidental take of listed

species; 3) information about other project impacts on the listed species; 4) construction dates; 5) an assessment of the effectiveness of conditions of certification in minimizing and compensating for project impacts; 6) recommendations on how mitigation measures might be changed to more effectively minimize and mitigate the impacts of future projects on the listed species; and 7) any other pertinent information, including the level of take of the listed species associated with the project;

9. In the event of a sighting in an active construction area (e.g., with equipment, vehicles, or workers), injury, kill, or relocation of any listed species, notify the CPM and BLM's Authorized Officer, CDFG and USFWS immediately by phone and in no event later than noon on the business day following the event if it occurs outside normal business hours so that the agencies can determine what further actions, if any, are required to protect listed species;

10. Prepare written follow-up notification via FAX or electronic communication to these agencies within 2 calendar days of the incident and include the following information as relevant:

    a. If a desert tortoise is injured as a result of project related activities during construction, the Designated Biologist will immediately take it to a CPM-approved wildlife rehabilitation and/or veterinarian clinic. Any veterinarian bills for such injured animals will be paid by the project owner. Following phone notification as required above, the CPM and BLM's Authorized Officer, CDFG, and USFWS will determine the final disposition of the injured animal, if it recovers. Written notification shall include, at a minimum, the date, time, location, circumstances of the incident, and the name of the facility where the animal was taken.

    b. If a desert tortoise is killed by project-related activities during construction, or if a desert tortoise is otherwise found dead, submit a written report with the same information as an injury report. These desert tortoises shall be salvaged according to guidelines described in *Salvaging Injured, Recently Dead, Ill, and Dying Wild, Free-Roaming Desert Tortoise* prepared by Kristin Berry, June 2001. The project owner shall pay to have these desert tortoises necropsied. The report shall include the date and time of the finding or incident.

    c. The CPM and BLM's Authorized Officer may issue the project owner a written stop work order to suspend any activity related to the construction or operation of the project for an appropriate period determined in consultation with the CPM and BLM's Authorized Officer in order to prevent or remedy a violation of one or more conditions of certification (including but not limited to failure to comply with reporting, monitoring, or habitat acquisition obligations) or to prevent the illegal take of an endangered, threatened, or candidate species. The project owner shall comply with the stop work order immediately upon receipt thereof.

Verification: No later than 2 calendar days following the above required notification of a sighting, kill, or relocation of a listed species, the project owner shall deliver to the CPM and BLM's Authorized Officer, CDFG, and USFWS via FAX or electronic communication the written report from the Designated Biologist describing all reported incidents of injury, kill, or relocation of a listed species, identifying who was notified, and explaining when the incidents occurred. In the case of a sighting in an active construction area, the project owner shall, at the same time, submit a map (e.g., using Geographic Information Systems) depicting both the limits of construction and sighting location to the CPM and BLM's Authorized Officer, CDFG, and USFWS.

Impact Avoidance and Minimization Measures

BIO-11 During construction the project owner shall implement all feasible measures to avoid or minimize impacts to biological resources, including the following:

1. Limit Disturbance Areas. The boundaries of all areas to be disturbed (including staging areas, access roads, and sites for temporary placement of spoils) shall be delineated with stakes and flagging prior to construction activities in consultation with the Designated Biologist. Spoils and topsoil shall be stockpiled in disturbed areas lacking native vegetation and which do not provide habitat for special-status species. All disturbances, project vehicles and equipment shall be confined to the flagged areas.
2. Minimize Road Impacts. New and existing roads that are planned for construction, widening, or other improvements shall not extend beyond the flagged impact area as described above. All vehicles passing or turning around will do so within the planned impact area or in previously disturbed areas. Where new access is required outside of existing roads or the construction zone, the route will be clearly marked (i.e., flagged and/or staked) prior to the onset of construction.
3. Minimize Traffic Impacts. Vehicular traffic during project construction and operation shall be confined to existing routes of travel to and from the project site, and cross country vehicle and equipment use outside designated work areas shall be prohibited. The speed limit shall not exceed 20 miles per hour within the project area, on maintenance roads for linear facilities, or on access roads to the ISEGS site.
4. Monitor During Construction. The Designated Biologist or Biological Monitor shall be present at the construction site during all project activities that have potential to disturb soil, vegetation, and wildlife. In areas that have not been fenced with tortoise exclusion fencing and cleared, the USFWS-approved Designated Biologist or Biological Monitor shall walk immediately ahead of equipment during brushing and grading activities.
5. Minimize Impacts of Transmission/Pipeline Alignments, Roads, Staging Areas. Staging areas for construction on the plant site shall be within the area that has been fenced with desert tortoise exclusion fencing and cleared. For construction activities outside of the plant site (transmission line, pipeline alignments) access roads, pulling sites, and storage and

parking areas shall be designed, installed, and maintained with the goal of minimizing impacts to native plant communities and sensitive biological resources. Transmission lines and all electrical components shall be designed, installed, and maintained in accordance with the APLIC's Suggested Practices for Avian Protection on Power Lines (APLIC 2006) and Mitigating Bird Collisions with Power Lines (APLIC 2004) to reduce the likelihood of large bird electrocutions and collisions.

6. Avoid Use of Toxic Substances. Road surfacing and sealants as well as soil bonding and weighting agents used on unpaved surfaces shall be non-toxic to wildlife and plants.
7. Minimize Lighting Impacts. Facility lighting shall be designed, installed, and maintained to prevent side casting of light towards wildlife habitat. To minimize risk of avian collisions with the heliostat towers, only flashing or strobe lights shall be installed on these towers.
8. Badger Surveys. Concurrent with the desert tortoise clearance survey, the Designated Biologist or Biological Monitors shall perform a preconstruction survey for badger dens in the project area, including areas within 250 feet of all project facilities, utility corridors, and access roads. If badger dens are found, each den shall be classified as inactive, potentially active, or definitely active. Inactive dens shall be excavated by hand and backfilled to prevent reuse by badgers. Potentially and definitely active dens shall be monitored by the Designated Biologist or Biological Monitor for three consecutive nights using a tracking medium (such as diatomaceous earth or fire clay) at the entrance. If no tracks are observed in the tracking medium after 3 nights, the den shall be excavated and backfilled by hand. If tracks are observed, the applicant shall develop and implement a trapping and relocation plan in consultation with the Designated Biologist and CDFG. BLM approval may be required prior to release of badgers on public lands.
9. Gila Monster Surveys. If a Gila monster is encountered during clearance surveys or during construction, a qualified biologist experienced with Gila monster survey and capture techniques shall capture and maintain it in a cool (<85 degrees F) environment until it can be released to a safe, suitable area beyond the construction impact zone. The biologist shall coordinate with staff and CDFG biologists in the transport and relocation of any Gila monsters encountered during project surveys, construction, or operation.
10. Avoid Vehicle Impacts to Desert Tortoise. Parking and storage shall occur within the area enclosed by desert tortoise exclusion fencing to the extent feasible. No vehicles or construction equipment parked outside the fenced area shall be moved prior to an inspection of the ground beneath the vehicle for the presence of desert tortoise. If a desert tortoise is observed, it will be left to move on its own. If it does not move within 15 minutes, a Designated Biologist or Biological Monitor may remove and relocate the

animal to a safe location if temperatures are within the range described in the USFWS protocol (*www.fws.gov/ventura/speciesinfo/protocols_guidelines* and Desert Tortoise Council 1999).

11. Avoid Wildlife Pitfalls:

a. Backfill Trenches. At the end of each work day, the Designated Biologist shall ensure that all potential wildlife pitfalls (trenches, bores, and other excavations) outside the area fenced with desert tortoise exclusion fencing have been backfilled. If backfilling is not feasible, all trenches, bores, and other excavations shall be sloped at a 3:1 ratio at the ends to provide wildlife escape ramps, or covered completely to prevent wildlife access, or fully enclosed with desert tortoise-exclusion fencing. All trenches, bores, and other excavations outside the areas permanently fenced with desert tortoise exclusion fencing shall be inspected periodically throughout the day and at the end of each workday by the Designated Biologist or a Biological Monitor. Should a tortoise or other wildlife become trapped, the Designated Biologist or Biological Monitor shall remove and relocate the individual as described in the Desert Tortoise Relocation/Translocation Plan. Any wildlife encountered during the course of construction shall be allowed to leave the construction area unharmed.

b. Avoid Entrapment of Desert Tortoise. Any construction pipe, culvert, or similar structure with a diameter greater than 3 inches, stored less than 8 inches aboveground and within desert tortoise habitat (i.e., outside the permanently fenced area) for one or more nights, shall be inspected for tortoises before the material is moved, buried or capped. As an alternative, all such structures may be capped before being stored outside the fenced area, or placed on pipe racks. These materials would not need to be inspected or capped if they are stored within the permanently fenced area after the clearance surveys have been completed.

c. Cap Heliostat Holes. All holes drilled for heliostats shall be capped the same day they are drilled. Caps shall remain on the holes until heliostats are inserted into the holes, and shall be securely fastened and sufficiently sturdy to cover the heliostat holes indefinitely. The caps shall exclude all wildlife, and shall be inspected weekly by the Designated Biologist or Biological Monitors to ensure that the caps remain in place and that birds and terrestrial wildlife have not become trapped.

12. Minimize Standing Water. Water applied to construction areas and dirt roads for dust abatement shall use the minimal amount needed to meet safety and air quality standards in an effort to prevent the formation of puddles, which could attract desert tortoises, common ravens and coyotes to construction sites.

13. Dispose of Road Killed Animals. Road killed animals or other carcasses detected in the project area or on roads near the project area shall be picked up immediately and delivered to the Biological Monitor. Within 1 working day of receipt of the carcass the Biological Monitor shall contact CDFG and/or USFWS for guidance on disposal or storage of the carcass.
14. Photographic Documentation of Bird Carcasses. On-site personnel shall photograph and record the location of all bird carcasses encountered within the solar fields, and shall provide the bird carcass, photograph, and location data to the Designated Biologist. The Designated Biologist shall identify the bird, ascertain a cause of death if possible, maintain a database of this information for all bird carcasses, and each year of operation shall provide a report summarizing this information to the the CPM and BLM's Authorized Officer, CDFG and USFWS.
15. Minimize Spills of Hazardous Materials. All vehicles and equipment shall be maintained in proper working condition to minimize the potential for fugitive emissions of motor oil, antifreeze, hydraulic fluid, grease, or other hazardous materials. The Designated Biologist shall be informed of any hazardous spills immediately as directed in the project Hazardous Materials Plan. Hazardous spills shall be immediately cleaned up and the contaminated soil properly disposed of at a licensed facility. Servicing of construction equipment shall take place only at a designated area. Service/maintenance vehicles shall carry a bucket and pads to absorb leaks or spills.
16. Worker Guidelines. During construction all trash and food-related waste shall be placed in self-closing containers and removed daily from the site. Workers shall not feed wildlife or bring pets to the project site. Except for law enforcement personnel, no workers or visitors to the site shall bring firearms or weapons. Vehicular traffic shall be confined to existing routes of travel to and from the project site, and cross country vehicle and equipment use outside designated work areas shall be prohibited. The speed limit when traveling on Colosseum Road and other dirt access routes within desert tortoise habitat shall not exceed 20 miles per hour.
17. Monitor Ground Disturbing Activities Prior to Site Mobilization. If ground-disturbing activities are required prior to site mobilization, such as for geotechnical borings or hazardous waste evaluations, a Designated Biologist or Biological Monitor shall be present to monitor any actions that could disturb soil, vegetation, or wildlife.

Verification: All mitigation measures and their implementation methods shall be included in the BRMIMP. Implementation of the measures shall be reported in the Monthly Compliance Reports by the Designated Biologist. Within 30 days after completion of project construction, the project owner shall provide to the CPM and BLM's Authorized Officer, for review and approval, a written construction termination report identifying how measures have been completed. The Designated Biologist shall provide to the the CPM and BLM's Authorized Officer, CDFG, and USFWS an annual

report summarizing all available data (species of carcass, date and location collected, and cause of death) describing bird and other carcasses collected within the project site each year.

Raven Management Plan

BIO-12 The project owner shall implement a Raven Management Plan that is consistent with the most current USFWS-approved raven management guidelines, and which meets the approval of USFWS, the CPM, and BLM's Authorized Officer in consultation with CDFG. The draft Raven Management Plan submitted by the applicant (CH2M Hill 2008a) shall provide the basis for the final plan, subject to review and revisions from USFWS, the CPM, and BLM's Authorized Officer, in consultation with CDFG.

Verification: At least 60 days prior to start of any project-related ground disturbance activities, the project owner shall provide the CPM, BLM's Authorized Officer, USFWS, and CDFG with the final version of a Raven Management Plan that has been reviewed by the CPM, USFWS, CDFG, and BLM. The the CPM and CPM and BLM's Authorized Officer will determine the plan's acceptability within 15 days of receipt of the final plan. All modifications to the approved Raven Management Plan shall be made only after approval by the CPM and BLM's Authorized Officer, in consultation with USFWS and CDFG.

Within 60 days after completion of project construction, the project owner shall provide to the CPM and BLM Authorized Officer for review and approval, a written report identifying which items of the Raven Management Plan have been completed, a summary of all modifications to mitigation measures made during the project's construction phase, and which items are still outstanding.

Weed Management Plan

BIO-13 The project owner shall implement a Weed Management Plan that meets the approval of BLM and the CPM. The draft Weed Management Plan submitted by the applicant (CH2M Hill 2008c) shall provide the basis for the final plan, subject to review and approval from the CPM and BLM Authorized Officer in consultation with USFWS, and CDFG. In addition to describing weed eradication and control methods, and a reporting plan for weed management during and after construction, the final Weed Management Plan shall include Best Management Practices, as specified in BLM's Programmatic Environmental Impact Statement for Vegetation Treatments Using Herbicides on Bureau of Land Management lands in 17 Western States to prevent the spread and propagation of noxious weeds, including the following:

1. Limit the size of any vegetation and/or ground disturbance to the absolute minimum, and limit ingress and egress to defined routes.
2. Maintain vehicle wash and inspection stations and closely monitor the types of materials brought onto the site.
3. Reestablish vegetation quickly on disturbed sites.

4. Monitoring and rapid implementation of control measures to ensure early detection and eradication for weed invasions.
5. Use only weed-free straw or hay bales used for sediment barrier installations, and weed-free seed.
6. Reclamation and revegetation shall occur on all temporarily disturbed areas, including pipelines, transmission lines, and staging areas.

Verification: At least 60 days prior to start of any project-related ground disturbance activities, the project owner shall provide the CPM and BLM's Authorized Officer with the final version of a Weed Management Plan. The CPM and BLM's Authorized Officer will determine the plan's acceptability within 15 days of receipt of the final plan. All modifications to the approved Weed Control Plan must be made only after consultation with the CPM and BLM's Authorized Officer, in consultation with USFWS and CDFG.

Within 30 days after completion of project construction, the project owner shall provide to the CPM and BLM's Authorized Officer for review and approval, a written report identifying which items of the Weed Management Plan have been completed, a summary of all modifications to mitigation measures made during the project's construction phase, and which items are still outstanding.

Closure, Revegetation, and Rehabilitation Plan

BIO-14 The project owner shall develop and implement a revised Closure, Revegetation and Rehabilitation Plan (Plan) in cooperation with BLM and Energy Commission staff to guide site restoration and closure activities, including methods proposed for revegetation of disturbed areas immediately following construction and rehabilitation and revegetation upon closure of the facility. This plan must address preconstruction salvage and relocation of succulent vegetation from the site to an onsite nursery facility for storage and propagation of material to reclaim disturbed areas. In the case of unexpected closure, the plan assumes restoration activities would possibly take place prior to the anticipated lifespan of the plant. The Plan shall address all issues discussed in **Appendix B - Biological Resources**: *Issues to Address in the Closure, Revegetation and Rehabilitation Plan*, and shall include but is not limited to the following elements in the revised plan:

1. Plan Purpose: The plan shall explicitly identify the objective of the revegetation plan to be re-creation of the types of habitats lost during construction and operation of the proposed solar energy facility. The final revegetation plan shall include introduction of mid- to late-successional species.
2. Standards/Monitoring: Performance standards for success thresholds, weed cover, performance monitoring methods and schedule, and maintenance monitoring in the revised Plan shall be conducted as described in **Appendix B - Biological Resources**.

3. Baseline Surveys – Baseline vegetation surveys for planning restoration efforts shall be conducted as described in **Appendix B - Biological Resources.**
4. Vegetation Clearing: Clearing of vegetation shall be limited to areas for which final maps are provided to BLM before approval of the ROW. Clearing of vegetation will be permitted on roads, utility routes, heliostat maintenance pathways, building and parking areas, and temporary staging areas provided these are specifically documented on a georeferenced construction alignment drawing or aerial photo or shape file, showing the exact locations of soil disturbance. BLM will consider relocating specific installations prior to the beginning of construction and during construction on a case by case basis but will not approve additional acreage beyond that addressed in the current application.
5. Vegetation Mowing; Vegetation mowing shall be limited to areas adjoining vehicle pathways used for heliostat installation to allow installation of the heliostat pylon and allow for tracking clearance under the heliostat. Vegetation mowing may be repeated during the life of the facility to maintain appropriate clearance for heliostat tracking.
6. Succulent Salvage: The revised Plan shall include a table that shows proposed succulent salvage by species the number of plants onsite, the lower threshold height for salvage, the number in each size class, and the fate of plants not salvaged. An inventory and map of proposed succulent transplants shall be provided as described in **Appendix B – Biological Resources**. Information gained from succulent transplant experience gained in ISEGS 1 shall be applied to future salvage operations, as described in **Appendix B - Biological Resources**.
7. Seed Handling: Seed collection, testing and application shall be conducted as described in **Appendix B - Biological Resources**, with collection areas within 10 miles of the project boundaries and on similar terrain, soil, exposure, slope, and elevation to the project site.
8. Soil Preparation: Soil descriptions, compaction measurements, mulch application, soil storage, seed farming, mycorrhizal inoculation, and biological crust collection and storage shall be conducted as described in **Appendix B - Biological Resources.** Soil stockpiles shall not be placed on areas that support special-status plant species or other sensitive biological resources.
9. Weed Management. Weed management activities needed to control weeds resulting from mirror washing shall be conducted as described in **Appendix B - Biological Resources**.
10. Final Closure Plan. A Final Closure Plan, which addresses the final revegetation and rehabilitation activities upon closure and decommissioning of the project, shall be completed as part of the revised Plan. The Final Closure Plan shall include a cost estimate, adjusted for

inflation, reflecting the costs of the revegetation, rehabilitation, and monitoring for the duration of time estimated to achieve the objective of re-creating plant communities impacted by the project.

<u>Verification:</u> No more than 30 days from the Energy Commission Decision and BLM Record of Decision, the project owner shall provide the CPM and BLM's Authorized Officer with a draft version of the revised Closure, Revegetation and Rehabilitation Plan. At least 60 days prior to start of any project-related ground disturbance activities, the project owner shall provide the CPM and BLM's Authorized Officer with the final version of the Closure, Revegetation and Rehabilitation Plan that has been reviewed and approved by the CPM and BLM's Authorized Officer. All modifications to the approved Revegetation and Reclamation Plan must be made only after consultation with the CPM and BLM's Authorized Officer.

Within 30 days after completion of project construction for each phase of development, the project owner shall provide to the CPM and BLM's Authorized Officer for review and approval, a written report identifying which items of the Closure, Revegetation and Rehabilitation Plan have been completed, a summary of all modifications to mitigation measures made during the project's construction phase, and which items are still outstanding.

At least one year prior to planned closure and decommissioning the project owner shall submit to the CPM and BLM Authorized Officer a final Closure Plan for review to determine if revisions are needed. The project owner shall incorporate all required revisions to the final Closure Plan and submit to the CPM and BLM Authorized Officer no less than 90 days prior to the start of ground disturbing activities associated with closure and decommissioning activities.

Pre-Construction Nest Surveys

BIO-15 Pre-construction nest surveys shall be conducted if construction activities will occur from February 1 through August 31. The Designated Biologist or Biological Monitor conducting the surveys shall be experienced bird surveyors familiar with standard nest-locating techniques and shall perform surveys in accordance with the following guidelines:

1. Surveys shall cover all potential nesting habitat in the project site or within 500 feet of the boundaries of the site and linear facilities;
2. At least two pre-construction surveys shall be conducted, separated by a minimum 10-day interval. One of the surveys needs to be conducted within the 14-day period preceding initiation of construction activity. Additional follow-up surveys may be required if periods of construction inactivity exceed three weeks, an interval during which birds may establish a nesting territory and initiate egg laying and incubation;
3. If active nests are detected during the survey, a buffer zone (protected area surrounding the nest, the size of which is to be determined by the Designated Biologist in consultation with CDFG) and monitoring plan shall be developed. Nest locations shall be mapped and submitted, along with a report stating the survey results, to the CPM and BLM; and

4. The Designated Biologist shall monitor the nest until he or she determines that nestlings have fledged and dispersed; activities that might, in the opinion of the Designated Biologist, disturb nesting activities, shall be prohibited within the buffer zone until such a determination is made.

Verification: At least 10 days prior to the start of any project-related ground disturbance activities, the project owner shall provide the CPM and BLM a letter-report describing the findings of the pre-construction nest surveys, including the time, date, and duration of the survey; identity and qualifications of the surveyor (s); and a list of species observed. If active nests are detected during the survey, the report shall include a map or aerial photo identifying the location of the nest and shall depict the boundaries of the no-disturbance buffer zone around the nest.

Burrowing Owl Impact Avoidance and Minimization Measures

BIO-16 The project owner shall implement the following measures for the burrowing owl:

1. Complete a pre-construction survey for burrowing owls for any areas subject to disturbance from construction prior to the start of initial ground disturbance activities. If burrowing owls are present within 500 feet of the project site or linear facilities, then the CDFG burrowing owl guidelines (1995) shall be implemented;
2. Monitor burrowing owl pairs within 500 feet of any activities that exceed ambient noise and/or vibration levels;
3. Establish a 500-foot set back from any active burrow and construct additional noise/visual barriers (e.g., haystacks or plywood fencing) to shield the active burrow from construction activities. Post signs (in both English and Spanish) designating presence of sensitive area;
4. Actively relocate all owls occupying burrows that will be temporarily or permanently impacted by the project and implement the following CDFG take avoidance measures:
    a. Occupied burrows shall not be disturbed during the nesting season (February 1 – August 31) unless a qualified biologist can verify through non-invasive methods that egg laying/incubation has not begun or juveniles are foraging independently and able to fly;
    b. A qualified biologist must relocate owls, confirm that owls have left burrows prior to ground-disturbing activities, and monitor the burrows. Once evacuation is confirmed, the biologist should hand excavate burrows and then fill burrows to prevent reoccupation; and
    c. Relocation of owls shall be approved by and conducted in consultation with CDFG.
5. Submit a Burrowing Owl Mitigation and Monitoring Plan to the CPM, BLM Authorized Officer and CDFG for review and approval prior to relocation of owls (and incorporate it into the project's BRMIMP) as well as a

construction termination report with results to CDFG, the CPM, and BLM Authorized Officer 30 days after completing owl relocation and monitoring and at least 30 days prior to the start of commercial operation.

Verification: The project owner shall complete a pre-construction survey for burrowing owls for any areas subject to disturbance from construction no more than 30 days prior to the start of any project-related site disturbance activities, and submit a report to the CPM, CDFG, USFWS, and BLM's Authorized Officer that describes when surveys were completed, observations, mitigation measures, and the results of the mitigation. If burrowing owls are to be protected on site or relocated, the project owner shall coordinate with and report to the CPM, CDFG, USFWS, and BLM staff on these proposed activities in a Burrowing Owl Mitigation and Monitoring Plan. Within 30 days after completion of owl relocation and monitoring, and the start of ground disturbance **or** at least 90 days prior to the sale of power, the project owner shall provide to the CPM, CDFG and BLM written construction termination report identifying how measures have been completed.

Desert Tortoise Compensatory Mitigation

BIO-17 To fully mitigate for habitat loss and potential take of desert tortoise, the project owner shall provide compensatory mitigation at a 3:1 ratio for impacts to 3,582 acres or the area disturbed by the final project footprint. At least two thirds of the 3:1 mitigation to satisfy the Energy Commission's Complementary Mitigation Measures shall be achieved by acquisition, in fee title or in easement, of no less than 7,164 acres of land suitable for desert tortoise. The project owner shall provide funding for the acquisition, initial habitat improvements and long-term management fee for these Energy Commission complementary compensation lands. The remaining third of the 3:1 compensatory mitigation, to satisfy BLM's mitigation requirements and the balance of the Energy Commission's mitigation requirements, shall be developed in accordance with BLM's desert tortoise mitigation requirements as described in the Northern and Eastern Mojave Desert Management Plan (BLM 2002).

BLM's compensatory mitigation plan, serving as one third of the 3:1 mitigation ratio required to satisfy CESA, shall consist of desert tortoise habitat enhancement, including installation of at least 50 miles of desert tortoise exclusion fencing on roadways in the Northeastern Mojave Recovery Unit, and habitat restoration of at least 50 routes within the Desert Wildlife Management Area. Areas identified for fencing include: the boundary of the town of Nipton, Nipton Road between the California-Nevada border and the junction of I-15, Ivanpah Road, Interstate 15 from Nipton Road to the Ivanpah Dry Lake, US Highway 95 through Piute Valley from the California-Nevada border to the town of Goffs, opr the boundary for the community of Goffs. Some of these roads (e.g. portions of Nipton Road and Ivanpah Road) may require fencing associated with the tortoise translocation plan. Any fencing deemed necessary for toirtoise translocation would be above and beyond the 50 miles required by this mitigation measure. In lieu of acquiring lands and implementing habitat enhancement or rehabilitation activities itself, the project

owner may satisfy the requirements of this condition by depositing funds into the Renewable Energy Action Team (REAT) Account established with the National Fish and Wildlife Foundation (NFWF) in an amount equivalent to the sum of: 1) BLM's compensatory mitigation cost to cover the cost of fencing and route restoration, calculated using formulas for biological Resource Compensation/Mitigation Cost Estimate Breakdown for use with the REAT-NFWF Mitigation Account Table of Estimated Costs dated July 13, 2010; 2) the Energy Commission's Complementary Mitigation Security for acquisition; and 3) the Long-Term Maintenance of Fencing and Habitat Restoration Fee; and 3) the NFWF administrative fee calculation, as shown in the following table:

Biological Resources Mitigation/Compensation Cost Estimate Table - July 13, 2010[1] corrected

		Desert Tortoise Compensation
Number of Acres		3582
Estimated number of parcels to be acquired, at 40 acres per parcel[2]		90
Land cost at $1000/acre[3]	$	3,582,000.00
Level 1 Environmental Site Assessment at $3000/parcel	$	270,000.00
Appraisal at no less than $5,000/parcel	$	450,000.00
Initial site work - clean-up, restoration or enhancement, at $250/acre[4]	$	895,500.00
Closing and Escrow Cost at $5000/parcel[5]	$	450,000.00
Biological survey for determining mitigation value of land (habitat based with species specific augmentation) at $5000/parcel	$	450,000.00
3rd Party Administrative Costs (Land Cost x 10%)[6]	$	358,200.00
Agency cost to accept land donation[7] (Land Cost x 15%) x 1.17 (17% of the 15% for overhead)	$	628,641.00
SUBTOTAL - Acquisition and Initial Site Work	$	7,084,341.00
Long-term Management and Maintenance Fund (LTMM) fee at $1450/acre [8]	$	5,193,900.00
NFWF Fees		
Establish Project Specific Account	$	12,000.00
NFWF Management fee³ for Acquisition and Enhancement Actions (Subtotal x 3%)	$	212,530.23
NFWF Management Fee for LTMM account (LTMM x 1%)	$	51,939.00
Subtotal of NFWF Fees	$	276,469.23
TOTAL **Estimated cost for deposit in project specific REAT-NFWF Account**	**$**	**12,554,710.23**

As discussed in the FSA/DEIS, the Energy Commission requirements for acquisition of 7,164 acres of compensation lands and maintenance of fencing and habitat enhancements shall include the following:

1. Responsibility for Acquisition of Lands: The responsibility for acquisition of lands may be delegated by written agreement from the Energy Commission and CDFG to a third party, such as a non-governmental organization supportive of Mojave Desert habitat conservation. Such delegation shall be subject to approval by the CPM and CDFG, in consultation with BLM and USFWS, prior to land acquisition, enhancement or management activities. If habitat disturbance exceeds that described in this analysis, the project owner shall be responsible for funding acquisition, habitat improvements and long-term management of additional compensation lands or additional funds required to compensate for any additional habitat disturbances. Additional funds shall be based on the adjusted market value of compensation lands at the time of construction to acquire and manage habitat. Water and mineral rights shall be included as part of the land acquisition. Agreements to delegate land acquisition to CDFG or an approved third party and to manage compensation lands shall be implemented within 18 months of the Energy Commission's decision.
2. Selection Criteria for Compensation Lands. The compensation lands selected for acquisition shall:
   a. be as close to the project site as possible;
   b. provide good quality habitat for desert tortoise with capacity to regenerate naturally when disturbances are removed;
   c. be near larger blocks of lands that are either already protected or planned for protection, or which could feasibly be protected long-term by a public resource agency or a non-governmental organization dedicated to habitat preservation;
   d. be connected to lands currently occupied by desert tortoise, ideally with populations that are stable, recovering, or likely to recover;
   e. not have a history of intensive recreational use or other disturbance that might make habitat recovery and restoration infeasible;
   f. not be characterized by high densities of invasive species, either on or immediately adjacent to the parcels under consideration, that might jeopardize habitat recovery and restoration, and
   g. not contain hazardous wastes.
3. Review and Approval of Compensation Lands Prior to Acquisition. A minimum of three months prior to acquisition of the property, the project owner shall submit a formal acquisition proposal to the CPM, CDFG, USFWS and BLM describing the parcel(s) intended for purchase. This acquisition proposal shall discuss the suitability of the proposed parcel(s)

as compensation lands for desert tortoise in relation to the criteria listed above. Approval from CDFG and the CPM, in consultation with BLM and the USFWS, shall be required for acquisition of all parcels comprising the 7,164 acres.

4. Energy Commission Complementary Mitigation Security The project owner shall provide financial assurances to the CPM and CDFG with copies of the document(s) to BLM and the USFWS, to guarantee that an adequate level of funding is available to implement the Energy Commission Complementary Mitigation Measures described in this condition. These funds shall be used solely for implementation of the measures associated with the project. Alternatively, financial assurance can be provided to the CPM and CDFG in the form of an irrevocable letter of credit, a pledged savings account or another form of security ("Security") prior to initiating ground-disturbing project activities. Prior to submittal to the CPM, the Security shall be approved by CDFG and the CPM, in consultation with BLM and the USFWS, to ensure funding in the amount of $17,981,640. This Security amount was calculated as follows and may be revised upon completion of a Property Analysis Record (PAR) or PAR-like analysis of the proposed compensation lands:

    a. land acquisition costs for compensation lands, calculated at $910/acre = $6,519,240;

    b. costs of initial habitat improvements to compensation lands, calculated at $250/acre = $1,791,000;

    c. costs of establishing afund for long-term management of compensation lands, calculated at $1,350/acre = $9,671,400; and

    d. total Energy Commission security for acquisition = $17,981,640.

    The project owner's financial responsibility for the actual cost of mitigation shall not increase by more than 25% of the Security Amount ($17,981,640).

5. Compensation Lands Acquisition Conditions The project owner shall comply with the following conditions relating to acquisition of the Energy Commission Complementary Mitigation compensation lands after the CDFG and the CPM, in consultation with BLM and the USFWS, have approved the proposed compensation lands and received Security as applicable and as described above.

    a. Preliminary Report: The project owner, or approved third party, shall provide a recent preliminary title report, initial hazardous materials survey report, biological analysis, and other necessary documents for the proposed 7,164 acres. All documents conveying or conserving compensation lands and all conditions of title/easement are subject to a field review and approval by CDFG and the CPM, in consultation with BLM and the USFWS, California Department of General Services and,

if applicable, the Fish and Game Commission and/or the Wildlife Conservation Board.

b. Title/Conveyance: The project owner shall transfer fee title or a conservation easement to the 7,164 acres of compensation lands to CDFG under terms approved by CDFG. Alternatively, a non-profit organization qualified to manage compensation lands (pursuant to California Government Code section 65965) and approved by CDFG and the CPM may hold fee title or a conservation easement over the habitat mitigation lands. If the approved non-profit organization holds title, a conservation easement shall be recorded in favor of CDFG in a form approved by CDFG. If the approved non-profit holds a conservation easement, CDFG shall be named a third party beneficiary. If a Security is provided, the project owner or an approved third party shall complete the proposed compensation lands acquisition within 18 months of the start of project ground-disturbing activities.

c. Initial Habitat Improvement Fund. The project owner shall fund the initial protection and habitat improvement of the 7,164 acres. Alternatively, a non-profit organization may hold the habitat improvement funds if they are qualified to manage the compensation lands (pursuant to California Government Code section 65965) and if they meet the approval of CDFG and the CPM. If CDFG takes fee title to the compensation lands, the habitat improvement fund must go to CDFG.

d. Long-term Management and Maintenance Fund. Prior to ground-disturbing project activities, the project owner shall provide to CDFG a non-wasting capital long-term management and maintenance fee in the amount determined through the Property Analysis Record (PAR) or PAR-like analysis that will be conducted for the 7,164 acres. The project owner's financial responsibility for the actual cost of mitigation shall not increase by more than 25% of the Security Amount $17,981,640). Alternatively, a non-profit organization may hold the long-term management and maintenance fees if they are qualified to manage the compensation lands (pursuant to California Government Code section 65965) and if they meet the approval of CDFG and the CPM. If CDFG takes fee title to the compensation lands, the long-term management and maintenance fee must go to CDFG, where it will be held in the special deposit fund established pursuant to California Government Code section 16370. If the special deposit fund is not used to manage the long-term management and maintenance fund, the California Wildlife Foundation or similarly approved entity identified by CDFG shall manage the long-term management and maintenance fund for CDFG and with CDFG supervision.

e. Interest, Principal, and Pooling of Funds. The project owner, CDFG and the CPM shall ensure that an agreement is in place with the long-

term management and maintenance fund holder/manager to ensure the following conditions:

- Interest. Interest generated from the initial capital endowment shall be available for reinvestment into the principal and for the long-term operation, management, and protection of the approved compensation lands, including reasonable administrative overhead, biological monitoring, improvements to carrying capacity, law enforcement measures, and any other action approved by CDFG designed to protect or improve the habitat values of the compensation lands.
- Withdrawal of Principal. The long-term management and maintenance fund principal shall not be drawn upon unless such withdrawal is deemed necessary by the CDFG or the approved third-party long-term management and maintenance fund manager to ensure the continued viability of the species on the 7,164 acres. If CDFG takes fee title to the compensation lands, monies received by CDFG pursuant to this provision shall be deposited in a special deposit fund established pursuant to Government Code section 16370. If the special deposit fund is not used to manage the long-term management and maintenance fund, the California Wildlife Foundation or similarly approved entity identified by CDFG will manage the long-term management and maintenance fund for CDFG with CDFG supervision.
- Pooling Long-term Management and Maintenance Funds. CDFG, or a CPM and CDFG approved non-profit organization qualified to hold long-term management and maintenance funds s pursuant to California Government Code section 65965, may pool the long-term management and maintenance funds with other such funds for the operation, management, and protection of the 7,164 acres for local populations of desert tortoise. However, for reporting purposes, the long-term management and maintenance fund must be tracked and reported individually to the CDFG and CPM.
- Reimbursement Fund. The project owner shall provide reimbursement to CDFG or an approved third party for reasonable expenses incurred during title, easement, and documentation review; expenses incurred from other state or state approved federal agency reviews; and overhead related to providing compensation lands.

6. Long-term Maintenance of Fencing and Habitat Restoration. The Project owner shall provide sufficient funds to maintain the habitat improvements required by BLM for the ISEGS project, including fencing of I-15 and other routes in the Northeastern Mojave Recovery Unit, and habitat restoration of routes in the Desert Wildlife Management Area. The maintenance shall occur as long as the routes continue to operate as functional roadways

and for the duration of project impacts. This long-term maintenance fee shall be calculated upon completion of a PAR or PAR-like analysis of the proposed enhancement actions, and shall be sufficient to fund annual inspections and repairs/maintenance of all fencing and habitat improvements completed as part of the BLM mitigation requirements for the ISEGS project. The project owner shall deposit the long-term maintenance fee into the REAT-NFWF account or another third-party recipient acceptable to the CPM and CDFG within 18 months of the Energy Commission decision.

The project owner is responsible for all compensation lands acquisition/easement costs, including but not limited to, title and document review costs, as well as expenses incurred from other state agency reviews and overhead related to providing compensation lands to the department or approved third party; escrow fees or costs; environmental contaminants clearance; and other site cleanup measures.

The Project owner may choose to satisfy its mitigation obligations identified in this Decision by paying an in lieu fee instead of acquiring compensation lands, pursuant to Fish and Game code sections 2069 and 2099 or any other applicable in-lieu fee provision, to the extent the in-lieu fee provision is found by the Commission to be in compliance with CEQA and CESA requirements.

<u>Verification:</u> A minimum of three months prior to acquisition of the property, the project owner shall submit a formal acquisition proposal to the CPM, CDFG, USFWS and BLM describing the parcels intended for purchase.

No later than 18 months following the publication of the Energy Commission Decision the project owner shall provide written verification to the CPM and CDFG that the Energy Commission Complementary Mitigation compensation lands or conservation easements have been acquired and recorded in favor of the approved recipient(s). Alternatively, no later than 30 days prior to beginning project ground-disturbing activities, the project owner shall provide written verification of Security in accordance with this condition of certification. If Security is provided, the project owner, or an approved third party, shall complete and provide written verification of the proposed compensation lands acquisition within 18 months of the start of project ground-disturbing activities. If NFWF or another approved third party is being used for the acquisition, the project owner shall ensure that funds needed to accomplish the acquisition are transferred in timely manner to facilitate the planned acquisition and to ensure the land can be acquired and transferred prior to the 18-month deadline. Within six months of the land or easement purchase, as determined by the date on the title, the project owner, or an approved third party, shall provide CDFG and the CPM with a management plan for the Energy Commission Complementary Mitigation compensation lands and associated funds. The CPM shall review and approve the management plan, in consultation with CDFG, BLM and the USFWS.

Within 90 days after completion of project construction, the project owner shall provide to the CPM and CDFG an analysis with the final accounting of the amount of habitat disturbed during project construction. If habitat disturbance exceeds 3,582 acres, the

project owner shall provide a compensation plan to the CMP for their review and approval, in consultation with CDFG, BLM and the USFWS. The compensation plan shall be submitted no later than 90 days from the CPM's receipt of the final accounting, and shall include a description of additional funds required or lands that must be purchased to compensate for the unanticipated habitat disturbances, and a schedule for that acquisition or funding inclusive of all associated long-term management and maintenance and enhancement costs. The amount of funding for habitat acquisition, initial habitat improvement, and long-term management fund shall be calculated at the adjusted market value at the time of construction.

No more than 60 days prior to ground-disturbing project activities, the project owner shall provide to the CPM for review and approval a PAR or PAR-like analysis to establish the appropriate amount for the long-term maintenance fee to fund maintenance of the proposed enhancement actions (desert tortoise exclusion fencing and DWMA route restoration).

No more than 30 days prior to ground-disturbing project activities, the project owner shall deposit the long-term maintenance fee to the REAT-NFWF account or another third-party recipient approved by the CPM in consultation with CDFG.

Starting with the first year following construction and continuing for the duration of project impacts, the project owner shall provide to the CPM and CDFG an annual report describing: the results of the annual inspection of fencing and rehabilitated routes; a summary of fence repairs and maintenance of reclaimed routes completed during the year; and recommendations and a cost estimate for repairs and maintenance activities needed for the upcoming year.

If the project owner elects to satisfy its mitigation obligations by paying an in-lieu fee instead of acquiring compensation lands, pursuant to Fish and Game code sections 2069 and 2099 or any other applicable in-lieu fee provision, the Project owner shall notify the Commission that it would like a determination that the Project's in-lieu fee proposal meets CEQA and CESA requirements.

Special Status Plant Impact Avoidance and Minimization

BIO-18 The project owner shall implement the following measures to avoid and minimize impacts to special-status plant species. Items 2, 3, 5, 6, 7, 10, and 11 are recommended exclusively by Energy Commission staff.

1. <u>On-Site Plant Avoidance/Minimization Areas:</u> To the extent feasible the project owner shall avoid and minimize disturbance to all special-status plant species within the project site. Impact avoidance (i.e., protection from project-related impacts of any kind through removal of acreage from the project footprint) and impact minimization efforts shall occur in all feasible locations. Impact avoidance shall focus on areas that support the highest density and diversity of special-status plant species and shall remove, at a minimum, the three areas totaling 476 acres and labeled "Rare Plant Mitigation Area" in **Figure 3-13** from the project footprint. The natural gas pipeline shall be aligned and narrowed to avoid special-status plant occurrences north of Ivanpah 3 as depicted in **Figure 3-13**. Impact

minimization shall be conducted throughout the site. Impact minimization within the solar field shall consist of protecting small perimeters ("halos") around Mojave milkweed, desert pincushion, and Rusby's desert-mallow plants as indicated in the applicant's January 2010 draft plan (Exhibit 81, Appendix B).

2. Protection Goals : The project owner shall implement all feasible measures to protect 75 percent of the individuals of small-flowered androstephium, Mojave milkweed, Rusby's desert-mallow, desert pincushion, nine-awned pappus grass, and Parish's club-cholla within the project area (as mapped in Figure 5-3 of the applicant's final botanical survey report. Each year during construction the measurement of percent protection achieved shall be calculated based on a comparison of numbers of individuals of each of these five species present in this area identified before construction compared to numbers remaining post – construction. These pre- and post-construction plant numbers shall be based on floristic surveys conducted by a qualified botanist.
3. Identify and Establish Special-Status Plant Protection Areas: The project owner shall identify Special-Status Plant Protection Areas for exclusion from the project footprint and avoidance of project-related impacts of any kind to facilitate achieving the 75 percent protection goal. To accurately identify the boundaries of these areas, pre-construction floristic surveys shall be conducted by a qualified botanist at the appropriate time of year for special-status plant identification, including both spring and summer/fall blooming periods. The surveys shall encompass at a minimum the three areas totaling 476 acres and labeled "Rare Plant Mitigation Area" in **Figure 3-13** and shall extend 150 feet on both sides of the proposed gas pipeline alignment and 250 feet out from the project fenceline. The locations of the Special-Status Plant Protection Areas shall be clearly depicted on all final maps and project drawings and descriptions for exclusion of all project activities.
4. Protection of Adjacent Occurrences: The project owner shall identify special-status plants occurrences within 250 feet of the project fenceline during the pre-construction plant surveys described above. A qualified botanist shall delineate the boundaries of these special status plant occurrences prior to the initiation of ground disturbing activities. These flagged special status plant occurrences shall be designated as Environmentally Sensitive Areas on plans and specifications, and shall be protected from accidental impacts during construction (e.g., vehicle traffic, temporary placement of soils or vegetation) and from the indirect impacts of project operation (e.g., herbicide spraying, changes in upstream hydrology, etc).
5. Develop and Implement a Special-Status Plant Protection and Monitoring Plan: The project owner shall develop and implement a Special-Status Plant Protection and Monitoring Plan for special-status plants occurring within the Special-Status Plant Protection Areas and on-site areas

designated for impact minimization. The goal of the Special-Status Plant Protection and Monitoring Plan shall be to maintain the special-status plant as healthy, reproductive populations that can be sustained in perpetuity. At a minimum, the Special-Status Plant Protection and Monitoring Plan shall:

- establish baseline conditions and numbers of the plant occurrences in all protected areas (i.e., those to be excluded from the footprint and on-site areas to be protected) and success standards for protection of special-status plant occurrences;
- provide information about microhabitat preferences and fecundity, essential pollinators, reproductive biology, and propagation and culture requirements for each special-status species;
- describe measures (e.g., fencing, signage) to avoid direct construction and operation impacts to special-status plants within all protected areas;
- describe measures to avoid or minimize indirect construction and operations impacts to special-status plants within protected areas (e.g., runoff from mirror-washing, use of soil stabilizers/tackifiers, alterations of hydrology from drainage diversions, erosion/sedimentation from disturbed soils upslope, herbicide drift, the spread of non-native plants, etc).
- provide a monitoring schedule and plan for assessing the numbers and condition of special-status plants; and
- identify specific triggers for remedial action (e.g., numbers of plants dropping below a threshold);

6. <u>Develop Special-Status Plant Remedial Action Plan :</u> The project owner shall develop a detailed Special-Status Plant Remedial Action Plan to be implemented if special-status plants within the 476 acres of protected area and on-site minimization "halos" fail to meet success standards described in the Special-Status Plant Protection and Monitoring Plan. The Plant Remedial Action Plan shall include specifications for ex-situ/off-site conservation of seed and other propagules, and the seed bank and other symbionts contained in the topsoil where these plants occur. The remedial measures described in the Plant Remedial Action Plan shall not substitute for plant protection or other mitigation measures. The Special-Status Plant Remedial Action Plan shall include, at a minimum:
   - guidelines for pre-construction seed collection (and/or other propagules) for each species;
   - specifications for collecting, storing, and preserving the upper layer of soil containing seed and important soil organisms;

- detailed replacement planting program with biologically meaningful quantitative and qualitative success criteria (see Pavlik 1996), monitoring specifications, and triggers for remedial action; and
- ecological specifications for suitable planting sites.

7. Seed Collection: Implementation of the Special-Status Plant Remedial Action Plan would require a source of local source of seeds/propagules. In addition, seed collection would serve to preserve germplasm in the event that all mitigation fails. The project owner shall develop and implement a Seed Collection Plan to collect and store seed for small-flowered androstephium, Mojave milkweed, Rusby's desert-mallow, desert pincushion, nine-awned pappus grass, and Parish's club-cholla. The source of these seeds shall be from plants proposed for removal within the project footprint. The project owner shall engage the services of a qualified contractor approved by the CPM to undertake seed collection and storage.
8. Gas Pipeline Revegetation and Monitoring: In the natural gas pipeline construction corridor where disturbed soils will be revegetated, the topsoil excavated shall be segregated, kept intact, and protected, under conditions shown to sustain seed bank viability. At a minimum, the top 2 cm of the soil shall be separately stored and preserved. Topsoil salvage, storing, and replacement shall be replaced in its original vertical orientation following pipeline installation ensuring the integrity of the top 2 cm in particular. The project owner shall prepare a Gas Pipeline Revegetation and Monitoring Plan targeted at re-establishment of Rusby's desert-mallow, desert pincushion, Mojave milkweed, and potentially other special-status plant species. The Gas Pipeline Revegetation and Monitoring Plan shall identify success criteria for re-establishment and shall continue for a period of no less than 10 years until the defined success criteria are achieved. The Gas Pipeline Revegetation and Monitoring Plan shall include measures for seeding or other remedial actions. If no individuals of Rusby's desert-mallow, desert pincushion, or Mojave milkweed, are located during the first year of monitoring, the project owner shall conduct supplemental seeding or other remedial measures in the area disturbed by natural gas pipeline installation.
9. Surveys on Acquired and Public Lands: The project owner shall conduct floristic surveys for Rusby's desert-mallow and Mojave milkweed on all lands that will be acquired as part of the desert tortoise compensatory mitigation requirements (see Condition of Certification **BIO-17**). The goal of the surveys shall be to identify at least the same number of occurrences on off-site compensation or public lands as the number of occurrences in the project area excluding the occurrences in the Special-Status Plant Protection Areas in **Figure 3-13**. If this goal is not met by surveys on proposed acquisition lands, additional surveys shall be conducted within suitable habitat on public lands. To be counted toward fulfillment of the goal, the occurrences must reflect new data not previously documented in other survey efforts. The survey requirements shall include the following:

- All surveys shall be conducted by a qualified botanist in accordance with BLM, CDFG, and CNPS plant survey guidelines;
- Surveys shall occur the first spring after construction begins and continue each year for a maximum of ten years until the same number of Mojave milkweed and Rusby's desert-mallow occurrences are identified on acquisition lands and/or public lands as located outside Special-Status Plant Protection Areas;
- For each year surveys are conducted yearly survey results shall be provided to the CPM, BLM's Authorized Officer and CDFG, and shall include CNDDB field survey forms for all special-status plant species encountered during the surveys;
- All field survey forms shall be submitted to the CNDDB at the time of submittal to the CPM, BLM and CDFG; and
- The project owner's qualified botanist shall submit a completion report documenting fulfillment of the target goals and which describe the number of new, previously undiscovered occurrences identified and mapped. Locations shall be reported with GPS coordinates compatible with inclusion in a GIS database.

10. Security for Implementation of Plans: The project owner shall provide security adequate to fund implementation of the Special-Status Plant Protection and Monitoring Plan, the Special-Status Plant Remedial Action Plan for the life of the project, as well as the Seed Collection Plan, and the Gas Pipeline Revegetation Monitoring Plan.

11. Acquire Off-Site Occurrence of Mojave Milkweed or Adjacent Land: The project owner shall acquire, in fee or in easement, a parcel or parcels of land that includes at least 30 acres supporting a viable occurrence of Mojave milkweed (or suitable habitat adjacent to a known occurrence). The terms and conditions of this acquisition or easement shall be as described in Condition of Certification **BIO-17** with the additional criteria that the Mojave milkweed mitigation lands: 1) provide habitat for the special-status plant species that is of similar or better quality (e.g., in terms of native plant composition) than that impacted; 2) contain OR abut a known occurrence of Mojave milkweed, ideally with populations that are stable, recovering, or likely to recover, that shares the same watershed as the land; and 3) be adequately sized and buffered to support self-sustaining special-status plant populations. These mitigation lands may be included with the desert tortoise mitigation lands ONLY if the above criteria are met. If sufficient new Mojave milkweed occurrences are discovered on desert tortoise compensation lands (not public lands) in accordance with item 9 above prior to acquiring this land, the associated security shall be refunded to the project owner.

Verification: No less than 30 days following the publication of the Energy Commission Decision the project owner shall submit final maps and design drawings

depicting the location of Special-Status Plant Protection Areas within and adjacent to the project site, and shall identify the species and numbers of plants within each of the Special-Status Plant Protection Areas.

No less than 30 days following the publication of the Energy Commission Decision the project owner shall submit draft versions of the Special-Status Plant Protection and Monitoring Plan, the Special-Status Plant Remedial Action Plan, the Seed Collection Plan, and the Gas Pipeline Revegetation Monitoring Plan for review by the CPM, BLM's Authorized Agent, and CDFG. The project owner shall also provide a cost estimate for implementation of these plans which is subject to approval by the CPM, BLM's authorized agent, and the CDFG. The final plans shall be submitted for approval by the CPM, in consultation with BLM's Authorized Agent, CDFG, and CNPS within 90 days of the publication of the Commission Decision. The final plans shall be incorporated into the BRMIMP. At this time, the project owner shall also provide security sufficient to fund the implementation of the plans.

Within 30 days of the start of construction, the project owner shall submit copies of the contract with the CPM-approved seed contractor and the check for seed collection and curation fees to the CPM.

The project owner shall identify special-status plant occurrences within 250 feet of the project fence line during the pre-construction plant surveys described above. A qualified botanist shall delineate the boundaries of these special-status plant occurrences at least 30 days prior to the initiation of ground disturbing activities.

On January 31st of each year following construction the project owner's qualified botanist shall submit a report, including CNDDB field survey forms, describing the results of off-site plant surveys for Mojave milkweed and Rusby's desert-mallow to the BLM's Authorized Officer, the CPM, CDFG, and CNDDB. Submittal of survey reports shall continue for a maximum of 10 years until the same number of occurrences in the project area excluding the occurrences in the Special-Status Plant Projection Areas are identified on these off-site lands. The project owner's qualified botanist shall submit a completion report documenting fulfillment of the target goals and which describe the number of new, previously undiscovered occurrences identified and mapped using GIS techniques for each species. Mapping results shall include GPS coordinates of the plants found.

The Designated Biologist shall maintain written and photographic records of the tasks described above, and summaries of these records shall be submitted along with the Monthly Compliance Reports to the CPM, BLM Authorized Agent, and CDFG. During project operation, the Designated Biologist shall submit record summaries in the Annual Compliance Report for a period not less than 10 years for the Gas Pipeline Revegetation Plan, and for the life of the project for the Special-Status Plant Protection and Monitoring Plan, and the Special-Status Plant Remedial Action Plan, including funding for the seed storage.

No less than 90 days prior to acquisition of the parcel (s) containing or adjacent to a known Mojave milkweed occurrence, the project owner, or a third-party approved by the CPM, in consultation with CDFG, shall submit a formal acquisition proposal to the CPM and CDFG describing the parcel(s) intended for purchase.

Draft agreements to delegate land acquisition to CDFG or an approved third party and agreements to manage compensation lands shall be submitted to Energy Commission staff for review and approval (in consultation with CDFG) prior to land acquisition. Such agreements shall be mutually approved and executed at least 60 days prior to start of any project-related ground disturbance activities. The project owner shall provide written verification to the CPM that the compensation lands have been acquired and recorded in favor of the approved recipient(s). Alternatively, before beginning project ground-disturbing activities, the project owner shall provide Security in accordance with this condition. Within 90 days after the land purchase, as determined by the date on the title, the project owner shall provide the CPM with a management plan for review and approval, in consultation with CDFG, for the compensation lands and associated funds.

Nelson's Bighorn Sheep Mitigation

BIO-19 To compensate for project impacts to Nelson's bighorn sheep the project owner shall finance, construct and manage an artificial water source in the eastern part of the Clark Mountain range or in the State Line Hills outside of designated Wilderness.

<u>Verification:</u> Within 60 days of publication of the BLM's Record of Decision, the project owner shall submit to the CPM, BLM's Authorized Officer and CDFG a Draft Bighorn Sheep Mitigation Plan identifying a proposed location for the artificial water source and providing plans for its construction and management. At least 60 days prior to start of any project-related ground disturbance activities, the project owner shall provide the CPM and BLM's Authorized Officer with the final version of the Bighorn Sheep Mitigation Plan that has been reviewed and approved by the CPM, BLM, and CDFG. The CPM and BLM's Authorized Officer will determine the plan's acceptability within 30 days of receipt of the final plan.

No later than 18 months following the publication of the BLM's Record of Decision, the project owner shall provide written verification to the CPM and BLM's Authorized Officer that the construction of the artificial water source has been completed. At the same time, the project owner shall provide evidence of an agreement (Memorandum of Understanding) and a funding mechanism to provide ongoing maintenance of the water source by CDFG or some other party approved by the CPM and BLM's Authorized Officer.

Streambed Impact Minimization and Compensation Measures

BIO-20 The project owner shall implement the following measures to avoid, minimize and mitigate for impacts to ephemeral drainages:

1. <u>Acquire Off-Site Desert Wash:</u> The project owner shall acquire, in fee or in easement, a parcel or parcels of land that includes ephemeral washes with at least 175 acres of state jurisdictional waters. The terms and conditions of this acquisition or easement shall be as described in Condition of Certification **BIO-17** with the additional criteria that the desert wash mitigation lands: 1) include at least 175 acres of state jurisdictional waters; 2) be characterized by similar soil permeability, hydrological and biological functions as the impacted drainages; and 3) be within the same

watershed as the impacted wash. The desert wash mitigation lands may be included with the desert tortoise mitigation lands ONLY if the above three criteria are met.

2. Security for Implementation of Mitigation: A security in the form of an irrevocable letter of credit, pledged savings account, or certificate of deposit for the amount of all mitigation measures pursuant to this condition of certification shall be submitted to, and approved by, the CPM, in consultation with CDFG, prior to commencing project activities within areas of CDFG jurisdiction. This amount shall be based on a cost estimate which shall be submitted to CDFG for review and to the CPM for approval within 60 days of the Energy Commission Decision's publication and prior to commencing project activities within areas of CDFG jurisdiction. The security shall be approved by the CPM, in consultation with CDFG's legal advisors, prior to its execution, and shall allow the CPM at its discretion to recover funds immediately if the CPM, in consultation with CDFG, determines there has been a default.
3. Preparation of Management Plan: The project owner shall submit to Energy Commission CPM and CDFG a draft Management Plan that reflects site-specific enhancement measures for the drainages on the acquired compensation lands. The objective of the Management Plan shall be to enhance the wildlife value of the drainages, and may include enhancement actions such as weed control, fencing to exclude livestock, or erosion control. No later than 12 months after publication of the Energy Commission Decision the project owner shall submit a final Management Plan for review and approval to the CPM and CDFG.
4. Right of Access and Review for Compliance Monitoring: The CPM reserves the right to enter the project site or allow CDFG to enter the project site at any time to ensure compliance with these conditions. The project owner herein grants to the CPM and to CDFG employees and/or their representatives the right to enter the project site at any time, to ensure compliance with the terms and conditions and/or to determine the impacts of storm events, maintenance activities, or other actions that might affect the restoration and revegetation efforts. The CPM and CDFG may, at the CPM's discretion, review relevant documents maintained by the operator, interview the operator's employees and agents, inspect the work site, and take other actions to assess compliance with or effectiveness of mitigation measures.
5. Notification: The project owner shall notify the CPM and CDFG, in writing, at least five days prior to initiation of project activities in jurisdictional areas as noted and at least five days prior to completion of project activities in jurisdictional areas. The project owner shall notify the CPM and CDFG of any change of conditions to the project, the jurisdictional impacts, or the mitigation efforts, if the conditions at the site of a proposed project change in a manner which changes risk to biological resources that may be substantially adversely affected by the proposed project. The notifying

report shall be provided to the CPM and CDFG no later than seven days after the change of conditions is identified. As used here, change of condition refers to the process, procedures, and methods of operation of a project; the biological and physical characteristics of a project area; or the laws or regulations pertinent to the project as defined below. A copy of the notifying change of conditions report shall be included in the annual reports.

a. Biological Conditions: a change in biological conditions includes, but is not limited to, the following: 1) the presence of biological resources within or adjacent to the project area, whether native or non-native, not previously known to occur in the area; or 2) the presence of biological resources within or adjacent to the project area, whether native or non-native, the status of which has changed to endangered, rare, or threatened, as defined in section 15380 of Title 14 of the California Code of Regulations.

b. Physical Conditions: a change in physical conditions includes, but is not limited to, the following: 1) a change in the morphology of a river, stream, or lake, such as the lowering of a bed or scouring of a bank, or changes in stream form and configuration caused by storm events; 2) the movement of a river or stream channel to a different location; 3) a reduction of or other change in vegetation on the bed, channel, or bank of a drainage, or 4) changes to the hydrologic regime such as fluctuations in the timing or volume of water flows in a river or stream.

c. Legal Conditions: a change in legal conditions includes, but is not limited to, a change in Regulations, Statutory Law, a Judicial or Court decision, or the listing of a species, the status of which has changed to endangered, rare, or threatened, as defined in section 15380 of Title 14 of the California Code of Regulations.

6. Code of Regulations: The project owner shall provide a copy of the Streambed Impact Minimization and Compensation Measures from the Energy Commission Decision to all contractors, subcontractors, and the applicant's project supervisors. Copies shall be readily available at work sites at all times during periods of active work and must be presented to any CDFG personnel or personnel from another agency upon demand. The CPM reserves the right to issue a stop work order or allow CDFG to issue a stop work order after giving notice to the project owner, the CPM, if the CPM in consultation with CDFG, determines that the project owner has breached any of the terms or conditions or for other reasons, including but not limited to the following:

a. The information provided by the applicant regarding streambed alteration is incomplete or inaccurate;

b. New information becomes available that was not known to it in preparing the terms and conditions;

c. The project or project activities as described in the Final Staff Assessment have changed; or

d. The conditions affecting biological resources changed or the CPM, in consultation with CDFG, determines that project activities will result in a substantial adverse effect on the environment.

7. <u>Best Management Practices</u>: The project owner shall also comply with the following conditions:

a. The project owner shall minimize road building, construction activities and vegetation clearing within ephemeral drainages to the extent feasible.

b. The project owner shall not allow water containing mud, silt, or other pollutants from grading, aggregate washing, or other activities to enter ephemeral drainages or be placed in locations that may be subjected to high storm flows.

c. The project owner shall comply with all litter and pollution laws. All contractors, subcontractors, and employees shall also obey these laws, and it shall be the responsibility of the project owner to ensure compliance.

d. Spoil sites shall not be located within drainages or locations that may be subjected to high storm flows, where spoil shall be washed back into a drainage.

e. Raw cement/concrete or washings thereof, asphalt, paint or other coating material, oil or other petroleum products, or any other substances that could be hazardous to vegetation or wildlife resources, resulting from project-related activities, shall be prevented from contaminating the soil and/or entering waters of the state. These materials, placed within or where they may enter a drainage or Ivanpah Dry Lake, by project owner or any party working under contract or with the permission of the project owner shall be removed immediately.

f. No broken concrete, debris, soil, silt, sand, bark, slash, sawdust, rubbish, cement or concrete or washings thereof, oil or petroleum products or other organic or earthen material from any construction or associated activity of whatever nature shall be allowed to enter into, or placed where it may be washed by rainfall or runoff into, waters of the state.

g. When operations are completed, any excess materials or debris shall be removed from the work area. No rubbish shall be deposited within 150 feet of the high water mark of any drainage.

h. No equipment maintenance shall occur within 150 feet of any ephemeral drainage where petroleum products or other pollutants from the equipment may enter these areas under any flow.

<u>Verification:</u> No less than 90 days prior to acquisition of the parcel (s) containing 175 acres of waters of the state, the project owner, or a third-party approved by the CPM, in consultation with CDFG, shall submit a formal acquisition proposal to the CPM and CDFG describing the parcel(s) intended for purchase.

Draft agreements to delegate land acquisition to CDFG or an approved third party and agreements to manage compensation lands shall be submitted to Energy Commission staff for review and approval (in consultation with CDFG) prior to land acquisition. Such agreements shall be mutually approved and executed at least 60 days prior to start of any project-related ground disturbance activities. The project owner shall provide written verification to the CPM that the compensation lands have been acquired and recorded in favor of the approved recipient(s). Alternatively, before beginning project ground-disturbing activities, the project owner shall provide Security in accordance with this condition. Within 90 days after the land purchase, as determined by the date on the title, the project owner shall provide the CPM with a management plan for review and approval, in consultation with CDFG, for the compensation lands and associated funds.

No fewer than 30 days prior to the start of work potentially affecting waters of the state, the project owner shall provide written verification (i.e., through incorporation into the BRMIMP) to the CPM that the above best management practices will be implemented and provide a discussion of work in waters of the state in Compliance Reports for the duration of the project.

BIO-21: The applicant shall consult with USFWS, BLM, and CFGD to obtain lists of special status plant species (i.e., Federally listed species, candidate specie, BLM sensitive, and California state listed species) that have the potential for occurrence on the project area based on the current distribution of the species, habitat associations, and previously documented occurrences of the species within the project area. Based on these species' lists provided by these agencies, the BLM shall consider whether further field surveys shall be conducted during the appropriate season and within suitable habitat in the Project area utilizing survey protocols appropriate for the species' of interest. If special status plant species occurrences are identified, the preferred mitigation would consist of avoidance, whenever practical. If not feasible for special status species, off-site mitigation would be negotiated with the BLM.

<u>Effectiveness</u>: This measure would be highly effective in collecting appropriate special status plant species data, if federal and state agencies indicate a reasonable probability of occurrences within the project area. Avoidance would protect the plants during construction, but operational activities may alter the microenvironment of the plants (e.g., water, sunlight, dust) sufficiently to adversely affect the plants. Off-site mitigation would compensate for losses.

BIO-22: The applicant shall prepare a MBTA Conservation Agreement in coordination with the USFWS, BLM, and CFGD. This Plan would identify procedures to minimize or eliminate impacts to MBTA species. Procedures may include, but are not limited to, pre-construction clearing and grading outside of breeding seasons, enforceable timing restrictions and identification of permissible

activities within a prescribed distance from active nests, survey protocols for raptors and MBTA species, buffer zones around active nests, monitoring and reporting requirements. The MBTA Conservation Agreement may also require monetary compensation or land acquisition. The MBTA Conservation Agreement would need the approval of the agencies prior to initiating surface disturbance activities.

Effectiveness: This mitigation measure would be moderately to highly effective in reducing impacts to MBTA species, depending on the details of the Conservation Agreement. The MBTA Conservation Agreement would ensure that the project did not result in a net loss of migratory birds.

BIO-23: The applicant shall conduct visual biweekly surveys for bird and bat mortalities throughout the project site. In addition to the photodocumentation of bird mortalities (Item #14 in BIO-11), mortalities and injuries to bats and other wildlife shall be photodocumented. Additionally, data would document the species affected and any overt signs of injury resulting in death (e.g., scorched feathers). This information would be compiled and provided to the BLM on quarterly intervals for the first three years, then annually thereafter, unless otherwise requested by the BLM. This data would add to the understanding of impacts of solar facilities on avian and bat species. BLM would maintain the authority to require additional mitigation of the applicant in the future to reduce collision or heat-related injuries.

Effectiveness: This mitigation would be highly effective in documenting avian and bat mortalities associated with the operation of the facility. If sufficient data are gathered to support the need for additional mitigation, the mitigation may ultimately be effective in reducing avian and bat injuries and mortalities if an effective mitigation measure can be identified in the future.

BIO-24: To minimize potential impacts to Nelson bighorn sheep, the applicant shall not use barbed wire fence on the northern perimeter of the Ivanpah 3 site, unless required for security reasons.

Effectiveness: This mitigation would be moderately effective in reducing injuries to bighorn sheep as they forage near the project site or use the area north of the project area for a movement corridor. This mitigation would not be enforced if the mitigation posed a reasonable security threat to the project.

BIO-25: The applicant shall monitor and control noxious and invasive weeds within 100 feet of the artificial water source. Control of weeds shall be coordinated with the BLM staff and shall consist of removal by mechanical methods, rather than herbicides.

Effectiveness: This mitigation measure would be moderately effective in controlling noxious and invasive weeds near the artificial water source, providing better access to the site by big game.

BIO-26: The applicant shall implement all mitigation identified by the USFWS in the Biological Opinion.

Effectiveness: This measure would be highly effective in ensuring mitigation within the USFWS' Biological Opinion was implemented.

BIO-27: The project owner shall implement the Closure, Revegetation, and Rehabilitation Plan, Revision 3, dated July 6, 2010, with the following modifications.

1. The long-term soil stockpiles, as discussed in Table 5-2 of the plan, will be no higher than 6 feet high.
2. The Preliminary Seeding Plan for Short-Term Disturbed Areas, and to be used as the basis for the seeding during final project decommissioning, will be based upon the species list provided in Table 7-1 of the plan, rather than the species list in Table 7-2. The list may be modified at the time of decommissioning based on seed availability.
3. Concrete will be removed to a minimum depth of 6 feet unless it is shown that a particular area is prone to flood hazards and a greater depth for concrete removal should be required. All concrete removed shall be hauled off the project site and disposed of in an approved facility. Crushed concrete will not be used as backfill on the site during decommissioning.
4. Succulents salvaged during project construction will not be sold by the applicant. Should excess succulents be removed that connot be transplanted in the Succulent Nursery Area, their disposition will be managed by BLM.

Effectiveness: This measure modifies Revision 3 of the Closure, Revegetation, and Rehabilitation Plan to incorporate procedures which will increase the probability of successful site rehabilitation.

BIO-28: Compliance with Eagle Act. USFWS has notified BLM that due to the proximity of known occupied golden eagle territories, and nthat the effects of power towers on bald and golden eagles is unknown, this project has the potential to take an eagle. Due to the distance of the project site to known eagle territories, available mitigation measures (some of which are already described in other measures identified in this section), and habitat compensation associated with other species (i.e. desert tortoise), USFWS believes that this project can reach the "no net loss" standard for golden eagles identified in the Eagle Act Rule if the applicant submits and implements an Avian Protection Plan. The holder shall submit an Avian Protection Plan for approval of the Authorized Officer within 6 months of the issuance of any ROW grant for the project. The Avian Protection Plan must be implemented within one year from the date of any ROW grant Notice to Proceed.

4.3.4 Summary

The proposed project would have direct, adverse impacts to 4,073 acres of desert tortoise habitat, which would require state and federal endangered species "take"

authorizations. The tortoises present in the ROW area would be removed and translocated to an area to the west of the project site. In addition to the direct loss of tortoise habitat, the proposed project would also fragment and degrade adjacent habitat, and could promote the spread of invasive plants and desert tortoise predators (ravens). The proposed project would also directly impact breeding and/or foraging habitat for other special-status wildlife species, including burrowing owl, loggerhead shrike, Crissal thrasher, golden eagle, and American badger. The proposed project would also impact vegetation in the 4,073-acre project area, including one species considered sensitive by BLM (the Rusby's desert-mallow). Finally, the proposed project would adversely impact ephemeral drainages through site grading, compaction, and construction of infrastructure within drainage channels. Although the proposed project construction method, Low Impact Development, would be designed to minimize direct impacts to these drainages, it is assumed that all 2,000 ephemeral drainages (198 acres of waters of the state) would be impacted, and would subject to a streambed alteration agreement with the CDFG. For each of these NEPA impacts identified, mitigation measures that have been proposed by the applicant, Energy Commission staff, other state and federal agencies, and BLM have been developed.

In addition to the evaluation of impacts under NEPA, the analysis of biological impacts of the proposed project in the DEIS included an evaluation of impacts to species considered sensitive under CEQA by the Energy Commission, including plant species listed by the CNPS. For these species, the Energy Commission staff proposed additional Conditions of Certification to reduce the identified impacts. Implementation of these additional Conditions of Certification on public lands would require BLM consent.

A comparison of the biological resources impacts between the proposed project, Mitigated Ivanpah 3 Alternative, Modified I-15 Alternative, and No Action Alternative is presented in **Table 4.3-5**.

The Mitigated Ivanpah 3 alternative would reduce surface disturbance impacts by a total of 433 acres. Of this total, 433 acres located along the northern portion of the proposed Ivanpah 3 site would be removed from the project, preserving an area of diverse, relatively undisturbed native habitat that contains few noxious or invasive weeds. The habitat contains numerous ephemeral drainages, adding to the locations diversity. Many of sensitive species, including desert tortoise utilize this area.

The Mitigated Ivanpah 3 Alternative was developed, in part, to reduce the impacts to wildlife and special status species. By reducing the project footprint by approximately 12.5 percent, the Mitigated Ivanpah 3 Alternative would result in a reduction in impacts to wildlife and special status species. Since the 433-acre area that would remain undisturbed is considered of relatively high quality and diverse native habitat, the benefits would be greater than avoidance of comparable acreage in other, lower quality habitat areas. Further, the location and magnitude of the Mitigated Ivanpah 3 Alternative helps retain large-scale ecological processes and migration corridors that are beneficial to wildlife species.

While the impacts from the Mitigated Ivanpah 3 Alternative would be less and would preserve some of the highest quality habitat, there would be long-term impacts to biological resources in comparison with the No Action Alternative.

The reconfiguration of the proposed Ivanpah Unit 3 to a site adjacent to I-15 would likely result in a reduction in overall impacts to biological resources. For desert tortoise, the Modified I-15 Alternative site would be located within an area already impacted by the proximity of the highway. It is estimated that 315 acres of the reconfigured location of Ivanpah Unit 3, equivalent to 25 percent of the Unit, is adversely impacted by the presence of the highway. Habitat is variable, with areas located below 2,750-feet in elevation consisting of lower quality habitat due to terrain (flat topography with fewer washes), lower forage quality, and proximity to the highway. Fewer tortoises and burrows have been reported at the alternative site (Berry 1984, Cashen 2010), although formal surveys have not been conducted. Consequently, the co-location of the Modified I-15 Alternative with the highway, coupled with fewer acres of high quality tortoise habitat, would likely result in fewer impacts to desert tortoise. Further, some of the highest densities of desert tortoise and highest quality habitat in the project area (the proposed Ivanpah Unit 3 site) would be avoided. Overall, impacts from the Modified I-15 Alternative likely would be less than the proposed project, but would remain greater than the No Action Alternative. Formal consultation with the USFWS will be required for desert tortoise impacts.

Reconfiguration of the Ivanpah Unit 3 site to the Modified I-15 Alternative site co-locates major facilities, while avoiding impacts to the northern portion of the proposed project area. As a consequence, movement corridors between mountainous areas north of the project area remain broad and relatively undisturbed. Human activities associated with the project are less likely to adversely impact big game species, including desert bighorn sheep, as well as other species (e.g., birds, bats) associated with mountainous habitats. Co-location would also reduce habitat fragmentation, leaving large portions of higher quality contiguous habitat intact.

Because the Modified I-15 Alternative would result in direct and indirect affects to wildlife species (e.g., vehicle-wildlife collisions, lower habitat quality within the highway easement, noise, artificial lighting), co-location would reduce adverse impacts to biological resources, while avoiding high quality habitat along the northern portion of the project area.

While some of the habitat within the Modified I-15 Alternative is similar in quality to the Ivanpah Unit 3 site, much of the alternative's habitat located below 2,750-feet in elevation is less diverse and of lower quality than that associated with the proposed project. Although surveys have not been conducted, it is anticipated that there would be fewer acres capable of sustaining rare plant communities, compared to the original Ivanpah Unit 3 site in the proposed project.

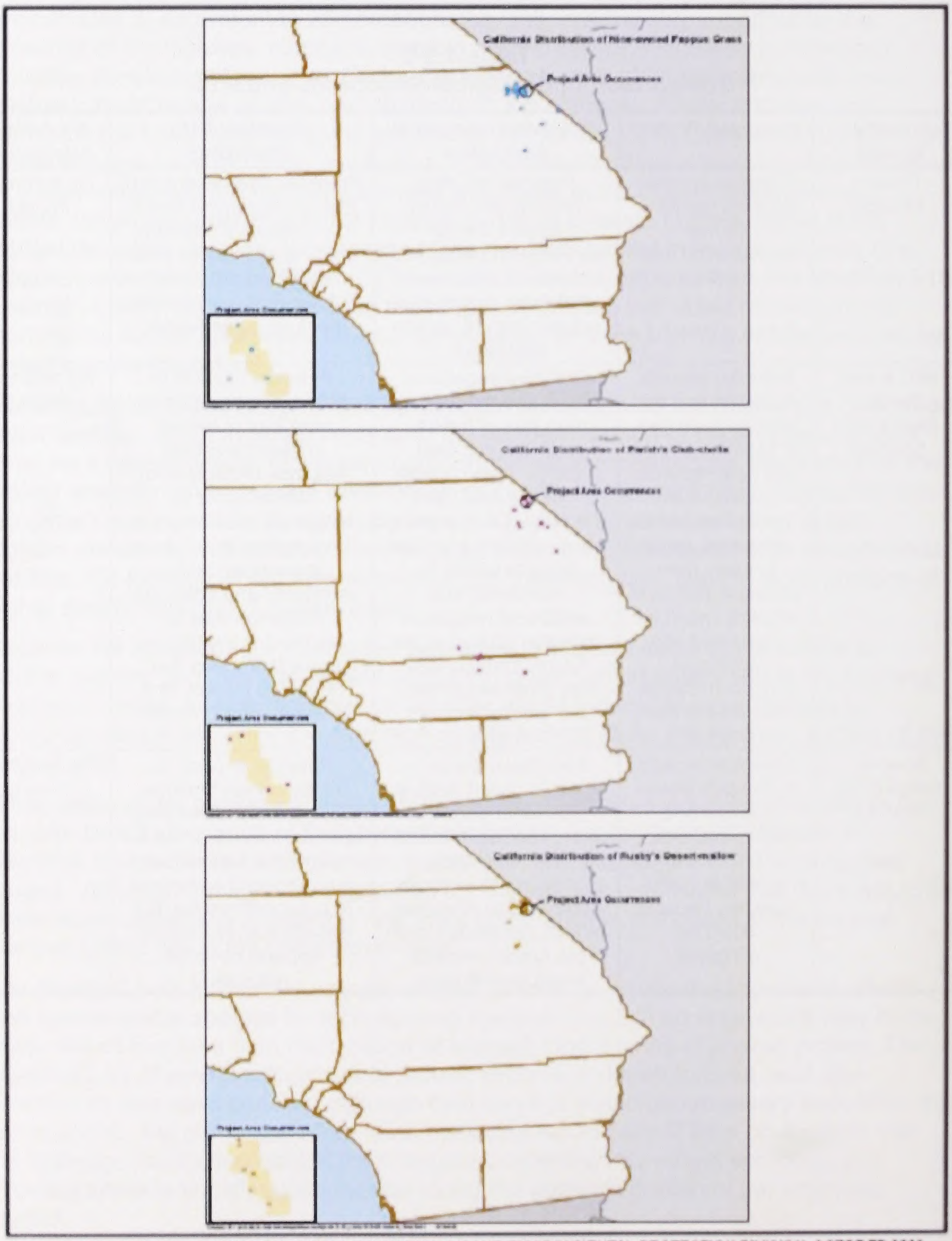
The Modified I-15 Alternative was developed, in part, to reduce the impacts to wildlife and special status species by reconfiguring Ivanpah Unit 3 in an area which may have fewer desert tortoises than the location of Ivanpah Unit 3 in the proposed project. The Modified I-15 Alternative likely would reduce impacts to desert tortoise, and also probably to rare plant species, although field surveys would be necessary to confirm this assessment. Big game and other wildlife species would benefit from co-location with the highway, minimizing habitat fragmentation, retaining movement corridors, and avoiding impacts to high quality habitat along the northern portion of the proposed project.

While the impacts from the Modified I-15 Alternative would be less than those associated with the proposed project, there would still be long-term impacts to biological resources in comparison with the No Action Alternative.

Table 4.3-5
Comparison of Biological Resources Impacts

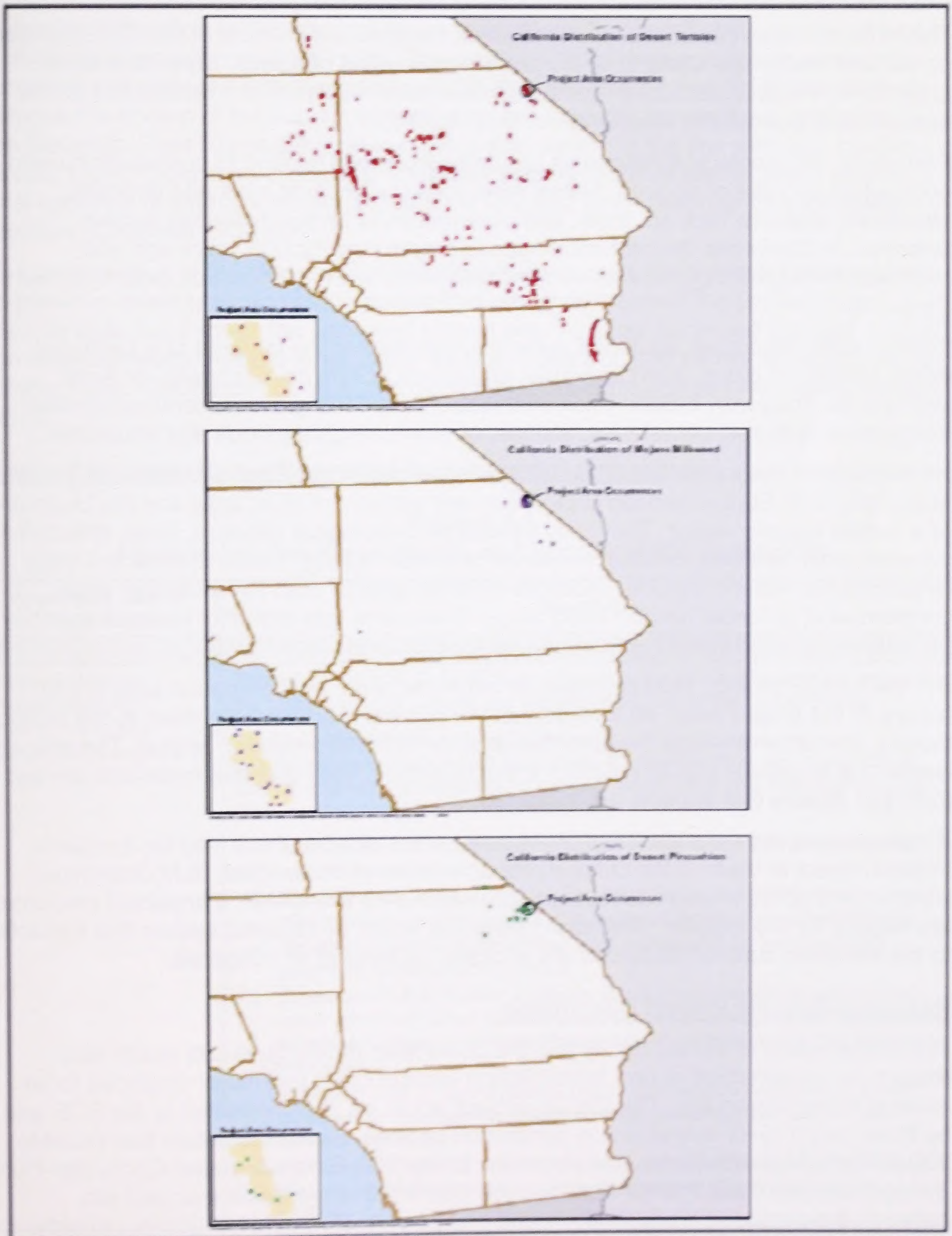
Potential Impact	Proposed Project	Mitigated Ivanpah 3 Alternative	Modified I-15 Alternative	No Action Alternative
Desert tortoise	Potential adverse impacts requiring formal consultation with USFWS	Potential adverse impacts that would require formal consultation if selected. Impacts less than proposed project, but greater than No Action alternative.	Potential adverse impacts that would require formal consultation if selected. Impacts anticipated to be less than proposed project, but greater than No Action alternative.	No potential impact
MBTA and Special Status Bat Species	Potential impacts to MBTA and bat species from loss of habitat, collision and heat hazards. Impacts from habitat could be mitigated, while impacts from collisions and heat impacts would be monitored and additional mitigation may be required in the future.	Potential impacts to MBTA and bat species from loss of habitat, collision and heat hazards. Impacts from habitat could be mitigated, while impacts from collisions and heat impacts would be monitored and additional mitigation may be required in the future. Impacts less than proposed project, but greater than No Action.	Potential impacts to MBTA and bat species from loss of habitat, collision and heat hazards. Impacts from habitat could be mitigated, while impacts from collisions and heat impacts would be monitored and additional mitigation may be required in the future. Impacts the less than proposed project, and greater than No Action.	No potential impact
Special-status plant species	Potential impacts to Rusby's desert mallow and Mojave milkweed, plus other sensitive plant species. Impacts could be mitigated.	Potential impacts to Rusby's desert mallow, plus other sensitive plant species. Impacts to native plant communities reduced compared to proposed project, but greater than No Action. Impacts could be mitigated.	Potential impacts to Rusby's desert mallow, plus other sensitive plant species. Impacts to native plant communities are likely reduced compared to proposed project, but greater than No Action. Impacts could be mitigated.	No potential impact

Figure 4.3-1A
California Distribution of Six Special-Status Species in the ISEGS Project Area



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: CNDDB, August 2009

Figure 4.3-1B
California Distribution of Six Special-Status Species in the ISEGS Project Area



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
SOURCE: CNDDB, August 2009

4.4 Cultural Resources

Introduction

This cultural resources assessment identifies the potential impacts of the ISEGS project on cultural resources. Cultural resources are defined as buildings, sites, structures, objects, and historic districts. Three kinds of cultural resources are considered in this assessment: prehistoric, ethnographic, and historic.

Prehistoric archaeological resources are those materials relating to prehistoric human occupation and use of an area. These resources may include sites and deposits, structures, artifacts, rock art, trails, and other traces of Native American human behavior. In California, the prehistoric period began over 12,000 years ago and extended through the eighteenth century until 1769, when the first Europeans settled in California.

Ethnographic resources are those materials important to the heritage of a particular ethnic or cultural group, such as Native Americans or African, European, or Asian immigrants. They may include traditional resource collecting areas, ceremonial sites, topographic features, cemeteries, shrines, or ethnic neighborhoods and structures.

Historic-period resources are those materials, archaeological and architectural, usually associated with Euro-American exploration and settlement of an area and the beginning of a written historic record. They may include archaeological deposits, sites, structures, traveled ways, artifacts, or other evidence of human activity. Under federal and state requirements, historic cultural resources must be greater than fifty years old to be considered of potential historic importance. A resource less than fifty years of age may be historically important if the resource is of exceptional importance.

For the ISEGS project, BLM provides an overview of the environmental setting and history of the project area, an inventory of the cultural resources identified in the project vicinity, and an analysis of the potential impacts from the proposed project. The primary concern is to ensure that all potential impacts are identified and that measures are set forth that ensure that impacts are mitigated.

If cultural resources are identified, BLM determines whether there may be a project-related impact to them. If the cultural resources cannot be avoided, BLM determines whether any of the impacted resources are eligible for the NRHP. If impacted resources are eligible for the register, mitigation measures would be required ensure that impacts to the identified cultural resources are avoided, minimized, or mitigated.

Resource-Specific Project Description

The transmission of the electricity that the generation facility produces would also require the construction of new transmission infrastructure and major upgrades to an existing transmission line. The ISEGS project would be interconnected to the SCE grid by three new 115-kV transmission generation tie lines, a new substation that includes 230-kV/115-kV switch-racks, and upgrades to the SCE Eldorado-Baker-Coolwater-Dunn Siding-Mountain Pass 115-kV transmission line, which traverses the project site between the proposed Ivanpah No. 1 and Ivanpah No. 2 (CH2M Hill 2008k). In order to

transmit the full generation load projected for the ISEGS project and other planned electric generation projects, the California ISO has determined that approximately 36 miles of the existing 115-kV transmission line would need to be upgraded. The upgrade would include constructing a new double-circuit 230-kV transmission line between the Eldorado Substation in Nevada and the proposed new Ivanpah Substation in California, a distance of approximately 36 miles. The existing 115-kV transmission line would be removed and replaced with the proposed 230-kV transmission line. SCE also plans to remove the portion of the subject transmission line from the project area southwest to the Mountain Pass Substation and to replace that portion of the line with two, double-circuit, 115-kV pole lines. Additional upgrades may be required as mitigation prior to final approval of interconnection to California ISO and Non-California ISO controlled facilities (California ISO 2008).

The construction of the proposed project would also require the applicant to take steps to preserve existing public access routes that presently traverse the project area. Vehicle trails run through the proposed project site. To allow continued use and access the applicant would reroute three public trails and one trail that serves as an access to a mining claim. Colosseum Road would be rerouted between Ivanpah No. 1 and Ivanpah No. 2.

Applicable Laws, Regulations, and Supplemental Authorities

Table 4.4-1
Applicable Laws, Regulations, and Supplemental Authorities

Applicable Law or Regulation	Description
Federal	
National Historic Preservation Act (NHPA) 16 U.S.C. section 470a to 470w-6	The NHPA, 16 U.S.C. §§ 470a to 470w-6, is the primary federal law governing the preservation of cultural and historic resources in the United States. The law establishes a national preservation program and a system of procedural protections which encourage the identification and protection of cultural and historic resources of national, state, tribal and local significance. Primary components of the act include: - Articulation of a national policy governing the protection of historic and cultural resources. - Establishment of a comprehensive program for identifying historic and cultural resources for listing in the National Register of Historic Places. - Creation of a federal-state/tribal-local partnership for implementing programs established by the act. - Requirement that federal agencies take into consideration actions that could adversely affect historic properties listed or eligible for listing on the National Register of Historic Places, known as the Section 106 Review Process. - Establishment of the Advisory Council on Historic Preservation, which oversees federal agency responsibilities governing the Section 106 Review Process. - Placement of specific stewardship responsibilities on federal agencies for historic properties owned or within their control (Section 110 of the NHPA).

Applicable Law or Regulation	Description
NEPA: Title 42, USC, section 4321-et seq.	This statute requires Federal agencies to consider potential environmental impacts of projects with Federal involvement and to consider appropriate mitigation measures.
FLPMA: Title 43, USC, section 1701 et seq.	This statute requires the Secretary of the Interior to retain and maintain public lands in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric water resource, and archeological values [Section 1701(a)(8)]; the Secretary, with respect to the public lands, shall promulgate rules and regulations to carry out the purposes of this Act and of other laws applicable to public lands [Section 1740].
Executive Order 11593 May 13, 1971 (36 Federal Register 8921)	This order mandates the protection and enhancement of the cultural environment through providing leadership, establishing state offices of historic preservation, and developing criteria for assessing resource values.
American Indian Religious Freedom Act; Title 42, USC, Section 1996	Protects Native American religious practices, ethnic heritage sites, and land uses.
Native American Graves Protection and Repatriation Act (1990); Title 25, USC Section 3001, et seq.,	The stature defines “cultural items,” “sacred objects,” and “objects of cultural patrimony;” establishes an ownership hierarchy; provides for review; allows excavation of human remains, but stipulates return of the remains according to ownership; sets penalties; calls for inventories; and provides for the return of specified cultural items.
U.S. Dept. of the Interior, BLM, the California Desert Conservation Area Plan 1980 as amended–Cultural Resources Element Goals	1. Broaden the archeological and historical knowledge of the CDCA through continuing efforts and the use of existing data. Continue the effort to identify the full array of the CDCA’s cultural resources.
	2. Preserve and protect representative sample of the full array of the CDCA’s cultural resources.
	3. Ensure that cultural resources are given full consideration in land use planning and management decisions, and ensure that BLM-authorized actions avoid inadvertent impacts.
	4. Ensure proper data recovery of significant (National Register of Historic Places-quality) cultural resources where adverse impacts cannot be avoided.
State	
Public Resources Code 5097.98 (b) and (e)	Requires a landowner on whose property Native American human remains are found to limit further development activity in the vicinity until he/she confers with the Native American Heritage Commission-identified Most Likely Descendents (MLDs) to consider treatment options. In the absence of MLDs or of a treatment acceptable to all parties, the landowner is required to reinter the remains elsewhere on the property in a location not subject to further disturbance.
California Health and Safety Code, Section 7050.5	This code makes it a misdemeanor to disturb or remove human remains found outside a cemetery. This code also requires a project owner to halt construction if human remains are discovered and to contact the county coroner.

Applicable Law or Regulation	Description
Local	
County of San Bernardino 2007 General Plan, Conservation Element, Goal CO 3 and Policies 3.1–3.5	The cultural and paleontological resources goal of the County is to preserve and promote its historic and prehistoric cultural heritage. The County intends to achieve this goal through the implementation of policies that identify and protect important archaeological and historic cultural resources in areas of the county that have been determined to have known cultural resource sensitivity, and on all lands where disturbance of previously undisturbed ground will occur. The County will, further, establish programs to preserve the information and heritage value of cultural and historical resources, comply with California Government Code Section 65352.2 (SB18) on all General Plan and specific plan actions, and ensure that important cultural resources are avoided or minimized to protect Native American beliefs and traditions. The San Bernardino County General Plan is not applicable to projects located on Federal lands.

4.4.1 Affected Environment

Information provided regarding the setting of the proposed project places it in its geographical and geological contexts and specifies the technical description of the project. Additionally, the archaeological, ethnographic, and historic backgrounds provide the contexts for the evaluation of the historical significance of any identified cultural resources within the project area of analysis.

Regional Setting

The proposed project area is in the Ivanpah Valley of the eastern Mojave Desert approximately 49 miles south-southwest of Las Vegas in San Bernardino County, California. The eastern Mojave Desert is a part of the Basin and Range physiographic province (Fenneman 1931), a broad region of almost parallel, block-faulted mountain ranges that trend approximately north to south and are characteristically separated by internally draining, debris-filled structural basins. The erosion of the largely Cenozoic era (beginning 65 million years ago and continuing to the present) ranges continues to contribute sediment to the poorly sorted gravel aprons or bajadas that predominate along the range flanks. The bajadas form most valley margins as they slope gradually down to the basin bottoms where seasonal lakes or playas often form. Low fault scarps and alluvial fans at the mouths of canyons periodically break the smooth, low-angle sweep of the bajadas (Eaton 1982; Thompson and Burke 1974). Local elevations in this part of the Mojave Desert range from approximately 1,700 to 2,600 feet above sea level on the valley bottoms to 4,900 to 7,900 feet above sea level along mountain range ridges. A bi-seasonal precipitation pattern in the eastern Mojave Desert delivers an average of six inches of annual rainfall from November through April and from July through September, with cool season precipitation being more significant (Hereford 2004). The largely alluvial parent material of the region's bajadas and valley bottoms, and the desert climate generally, support more weakly developed soil orders (Entisols and Aridisols) (NRCS 2007) where a Mojave Creosote Bush Scrub vegetation type predominates (CH2M Hill 2007, p. 5.2-9).

Project, Site, and Vicinity Description

The site of the proposed project is on the middle portion of a bajada above and to the west of Ivanpah Dry Lake, a large playa that forms the bottom of Ivanpah Valley. The use of the project area, presently under the jurisdiction of the Needles Field Office in the BLM's California Desert District, has historically been rather marginal. A sparse veneer of stone tools and stone chipping debris evidence a transitory Native American use of the project area and vicinity in the period prior to complete Euroamerican subjugation. The project area also appears to have been subject to sporadic prospecting for mineral resources over the last approximately 160 years. Sporadic mineral prospecting in and near the project area continues today. The eroded mountain remnants that jut above the relatively smooth, sloping surface of the proposed project area, landforms known as inselbergs, show evidence, in the form of abandoned and active prospect pits, of exploratory activity. The proposed project area's concurrent historic use has been for low intensity livestock grazing. The property continues this tradition of use today as part of the BLM Clark Mountain Allotment Grazing Lease (Clark Mountain Allotment) (CH2M Hill 2007, p. 5.6-14) adjacent to the Primm Valley Golf Club, Desert Course.

Environmental Setting

The proposed project area is a roughly 4,065-acre expanse of what is today an arid bajada. The environment of the bajada has changed through time causing concomitant shifts in the mosaic of natural resources available on it and adjacent landforms. Human use of the proposed project area over the past several thousand years may partly reflect local changes in the natural resource base. To more reliably assess the likelihood that archaeological deposits representing such use may be present, it is important to consider the historic character of local climate change, or the paleoclimate, and the effects of the paleoclimate on the physical development of the bajada and its ecology.

Paleoclimate

The present climate in the proposed project area represents a moderately dry and harsh period in the climate of the region relative to the last 12,000 years, the minimum timeframe for a human presence in the Mojave Desert. The climate of the Mojave Desert since the late Pleistocene epoch (prior to 10,000 thousand years ago) can be split into three broad phases. The climate of the region during the Pleistocene was relatively much more moist or mesic than the present climate and led to the development of a number of large permanent lakes on the floors of the region's valleys. The lakes slowly evaporated during the early Holocene epoch (10 thousand years ago to present) as the climate progressively became more arid. The period from approximately 5000 to 3000 B.C. marks a time of extreme aridity, often referred to as the mid-Holocene Altithermal (see Antevs 1948), and it marks the final desiccation of the lakes in the region. The climate since approximately 3000 B.C. has typically been more mesic relative to conditions during the Altithermal, and there is evidence for particularly wet periods from approximately 1000 B.C. to A.D. 1, and again from approximately A.D. 500 to 1400 (Bamforth 1990, p. 72).

Geology

The proposed project area lies on the western flank of the Ivanpah Valley in the eastern Mojave Desert. The Ivanpah Valley is an elongate, internally draining, structural basin (Park, et al. 2003, p. 72), a bolson, which trends approximately north to south. It is roughly 44 miles in length, typically averages 15 miles in width, and ranges in elevation from 2,608 feet above sea level on the valley floor to between 5,883 and 7,897 feet above sea level along the surrounding mountain ridges. The Ivanpah Mountains, the Clark Mountain Range, and the Spring Mountains bound the valley to the southwest, west, and northwest, respectively. The Lucy Gray Mountains, McCollough Range, and the New York Mountains bound the valley to the northeast, east, and southeast, respectively. The Clark Mountain Range and the Spring Mountains form an arc of Mesozoic to Paleozoic marine and terrestrial sedimentary rocks around a core of earlier Precambrian metamorphic rocks, with Tertiary volcanic rocks infrequently intruding into the sedimentary formations of the Spring Mountains. Along the eastern margin of the valley, the Lucy Gray Mountains, the McCollough Mountain Range, and the northern portion of the New York Mountains include Precambrian intrusive igneous and metamorphic rocks and Tertiary volcanic rocks. The balance of the New York Mountains and the Ivanpah Mountains are almost entirely Mesozoic granitic rocks (Jennings 1961; House, Buck, and Ramelli 2006; Ramelli, House, and Buck 2006a, 2006b). This diverse group of rocks is the source of the clastic[14] sediments that make up the Quaternary landforms across the valley and form the substrate in which local soil types develop.

Geomorphology

The discussion of the geomorphology of the proposed project area considers how and when the underlying bajada may have developed, and helps provide the physical contexts to assess whether physical remains from the past human use of former land surfaces on the bajada may be present as archaeological deposits.

Process Geomorphology

The Ivanpah Valley contains examples of most of the major landforms that are characteristic of Basin and Range bolsons. Alluvial fans, fan remnants, and bajadas front the mountain ranges that ring the valley. Below the coarse alluvial fan and remnant fan deposits, the broad bajadas sweep gradually down onto Ivanpah Dry Lake, the playa that forms the bottom of the valley floor. Numerous intermittent stream channels flow out of the mountains over more recent alluvial fans and past older fan remnants to braid across bajada surfaces and terminate out on the playa. The fine sediments that these stream channels transport are the source of playa fill and the dune sand along the playa margins.

The proposed project area is on the middle portion of a bajada that drapes the eastern base of the Clark Mountain Range. The project area ranges from approximately 180 feet to 835 feet above the floor of the playa. Gravity and water variously act to transport and deposit the weathered bedrock sediments that make up the broad bajada of the proposed project area. The sediments are typically larger and more poorly sorted

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[14] Clasts are rock fragments produced by physical processes.

upslope toward the mountains and grade to finer, better sorted particles downslope where the bajada deposits ultimately interfinger with the lacustrine[15] sediments of the playa and other wind-blown or eolian deposits, and water-transported or alluvial deposits related to the playa's hydrological cycles.

The present surface of the proposed project area bajada is a mosaic of interconnected or anastomosing, intermittent stream channels (Cultural Resources Plate 1) of mostly coarse to very coarse sands, incipient desert pavements[16] of predominately very angular gravels and variable overflow and sheetwash deposits. One large and one small inselberg break the surface of the bajada adjacent to the northern portion of the proposed project area and represent relatively infrequent examples of such landforms in Ivanpah Valley.

The proposed project area bajada is a dynamic landform the development of which has undoubtedly been subject to alternating cycles of deposition and erosion that occur in response to regional fluctuations in climate. The presence on the surface of the proposed project area, in overflow and sheetwash deposits and in incipient desert pavements, of mixtures of very angular gravels with relatively fresh faces or new cleavage planes and rounded, sand-blasted gravels with well-developed rock varnish indicate a relatively mobile bajada surface in the recent past where former desert pavements are being eroded as new ones are being formed. A firm understanding of whether the net result of the dynamic processes at work on the surface of the bajada is or has been the thickening of bajada deposits, or the erosion of them, is important to the interpretation of the history of the bajada's development, its potential as a resource base for human use, and its potential to preserve archaeological deposits related to any such use.

Historical Geomorphology

The results of a recent geoarchaeology study of the proposed project area indicates that the present surface of the underlying bajada is a patchwork of actively eroding surfaces amid what have become slightly elevated remnants of older bajada surfaces of predominantly middle-to-late Holocene age (CH2M Hill 2008j, pp. 9–18). An analysis in that study of the beach zones beneath the vicinity of the project area along the edge of Ivanpah Dry Lake suggests that the character of sediment deposition on the bajada was progradational[17] after approximately 6700 B.C. Deposition of sediments along the base of the bajada buried the beach zone there that was formed during the last high stand of Ivanpah Dry Lake during the early Holocene. The depositional regime on the bajada changed to one of net erosion after approximately 2000 B.C., most likely in response to the general increase in effective moisture in the late Holocene that appears to have led

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[15] Derived from lake environments.

[16] Desert pavements are single layers of clasts borne upward over time by the slow, continual accretion of wind-borne silt. They progressively become more level and darker in contrast, and the surface clasts in the pavements become more tightly interlocked with age.

[17] Progradation refers to a depositional regime on alluvial fans, which are constituent landforms of bajadas, where streams are cutting down through the upper slopes of alluvial fans and depositing the eroding sediments on the lower slopes of those same fans.

to a concomitant increase in vegetation cover and a decrease in the available sediment load.

The morphology of the present surface of the bajada is the result of erosion over the last 4,000 years. A complex network of anastomosing, intermittent stream channels traverse the bajada among remnant patches of older bajada surfaces that now rise several feet above the eroding surface of the broader landform. The remnant surfaces cover approximately 472 acres or 12 percent of the approximately 4,065-acre proposed project area. The remnant older bajada surfaces appear darker in contrast and are stonier relative to adjacent eroded surfaces. Desert pavements or incipient desert pavements form many of the remnant surfaces, while a few are more appropriately considered as stony debris flow remnants. Two of the darker (older) remnant surfaces observed in the recent study appear, on the basis of comparison to pavements in the Mojave Sink approximately 35 miles to the west, to be no older than early Holocene in age.

Pedology

The distribution of soil types over the bajada of the proposed project area provides a further index of the relative stability of different portions of the bajada's surface. The downslope portions of the proposed project area, where more recent alluvial deposits such as inset fans and intermittent stream floodplains and channels predominate, support the Arizo loamy sand, a very deep, excessively drained soil that forms in mixed alluvium. Arizo series soils are Entisols, an order where the parent material is clearly evident and where distinct soil horizons are absent.

The upslope portions of the proposed project area where older, more stable landforms such as alluvial fan remnants are present support the Popups sandy loam, a moderately deep, well-drained soil that also forms in mixed alluvium. Popups series soils are Aridisols, an order where soils develop distinct horizons under arid conditions. The development of a weakly cemented duripan approximately 33 to 59 inches below the surface is a characteristic of the Popups series that indicates a relative antiquity for soil types of the series.

Paleoecology

The ecology of the proposed project area has been dynamic through time. The vegetation type that is presently predominant in the project area is the Mojave Creosote Bush Scrub, which is typical in and on the valleys, alluvial fans, and lower mountain slopes of the Mojave Desert. The Mojave Yucca-Nevada Ephedra Scrub and Mojave Wash Scrub types are also present. The diversity of the vegetation types and the plant species in the project area generally decrease as one moves downslope across the project area bajada (CH2M Hill 2007, pp. 5.2-9, 5.2-27, and 5.2B-1).

The vegetation types above and to the west of the proposed project area vary as one ascends the slopes of the Clark Mountain Range. The Mojave Creosote Bush Scrub vegetation type grades into the Joshua Tree Woodland which, in turn, grades into the

Piñon Pine-Juniper Woodland. This clinal[18] variation in vegetation patterns is common in southern California (Holland and Keil 1995, p. 397).

It is probable that the composition and pattern of local vegetation types has moved up and down in elevation across the proposed project area over the last 12,000 years in response to regional shifts in climate. A woodland association of *Pinus monophylla* (piñon pine), *Juniperus osteosperma* (Utah juniper), *Purshia mexicana* (bitterbush), *Cercocarpus ledifolius* (mountain mahogany), and *Prunus fasciculata* (desert almond) was found prior to approximately 9500 B.C. in areas higher than 3000 feet above sea level where *Larrea tridentata* (creosote bush) presently prevails. A desert scrub association of *Lycium cooperi* (wolfberry), *Salvia mojavensis* (Mojave sage), and *Prosopis juliflora* (mesquite) was found from approximately 8800 to 8400 B.C. near lacustrine shorelines in the region lower than 3,000 feet below sea level. Creosote bush does not appear to have become dominant in the region before 3000 B.C. And modern vegetation associations do not appear to have been in place before approximately 2500 B.C. (Koehler, Anderson, and Spaulding 2005).

Prehistoric Setting

The prehistory of the eastern Mojave Desert is the narrative of how human populations have adapted to marked fluctuations in the local environment over the course of at least the last 12,000 years. The archaeological remains of the region's prehistory are relatively scarce. Sparse scatters of stone tools and chipped stone tool manufacturing debris, and isolated artifacts, resources that typically yield information of marginal value, account for 40 to 60 percent of the archaeological remains found in the Mojave and Colorado Deserts. A relative paucity of intact buried archaeological deposits contributes further to the dearth of information on the prehistory of the region (Lyneis and Macko 1986, p. 52). The availability of water and the location of high-value resource patches in otherwise unproductive habitats appear to influence the distribution of the archaeological sites that are on the desert landscape (Lyneis and Macko 1986, p. 57; Sutton et al. 2007, p. 230). The broad trajectory of cultural development in the Mojave Desert appears to be a steady decline in residential mobility as local populations come to occupy increasingly larger valley or basin bottom base camps, in a few preferred locations, over longer periods of time, rather than working out of temporary camps in particularly productive environmental zones (Bamforth 1990, p. 74).

Over the past seven decades, Mojave Desert archaeologists have developed and refined a broad sequence of approximately six artifact groups or assemblages, each with distinctive types of stone projectiles, that represent the material record of the peoples who once lived in the proposed project area (Bamforth 1990, p. 72; Campbell 1936; Lyneis 1982; Rogers 1939; Sutton, et al. 2007; Warren 1984; Warren and Crabtree 1986). Choosing a cultural chronology more applicable to the proposed project area than that used in the AFC (CH2M Hill 2007, pp. 5.37–5.3-10) and acknowledging recent proposed refinements to the chosen chronology (Sutton, et al. 2007), the discussion here of the region's prehistory will rely primarily on Warren's 1984

[18] A gradual change in a character or feature across the distributional range of a species or population, usually correlated with an environmental or geographic transition.

chronology and Warren and Crabtree's 1986 chronology. Following Warren and Crabtree, the periods of the chronology below represent units of time during which particular artifact assemblages appear to prevail rather than discrete, homogeneous past cultures.

Terminal Pleistocene Period (Prior to 10,000 B.C.)

The archaeological record of the Terminal Pleistocene Period in the Mojave Desert is particularly sparse. The most consistent evidence for human activity during this period are fragments of the characteristic fluted, concave-based, lanceolate spear or projectile point of the Clovis archaeological culture. The Clovis culture is a pan-Western Hemisphere archaeological phenomenon that manifests in diverse material patterns over North and South America. In the Mojave Desert, material culture assemblages that include Clovis projectile point fragments are typically sparse surface deposits (Lyneis and Macko 1986, p. 41). The evidence from such deposits suggests only that human groups during this time were probably small in number, were highly mobile, and lived in small, temporary camps near what were then permanent water sources (Sutton, et al. 2007, p. 234). It is unclear whether the Mojave Desert Clovis assemblages demonstrate a cultural continuity with the material remains of subsequent periods (Warren and Crabtree 1986, p. 184).

Lake Mojave Period (10,000 to 5000 B.C.)

Lake Mojave Period artifact assemblages appear to represent a cultural phenomenon that is antecedent to subsequent cultural developments in the Mojave Desert (Warren and Crabtree 1986, p. 184). Portions of archaeological sites or components that date to the Lake Mojave Period are typically sparse and vary little in assemblage composition (Bamforth 1990, p. 73), although components that include extensive accumulations of residential debris have more recently been found (Sutton, et al. 2007, p. 237). Lake Mojave components are most often found in the vicinity of high terraces above or on relict shorelines of what are now playas and along relict stream channels (Bamforth 1990, p. 72; Lyneis and Macko 1986, p. 41).

Lake Mojave Period assemblages include a relatively narrow range of stone tools and also represent a narrow range of site types. The index artifacts for the period are the local variants of the Great Basin stemmed series projectile point types, Lake Mojave and Silver Lake points. The balance of period assemblages may include bifaces, steep-edged unifaces, "small beaked gravers," "narrow concave scrapers," crescents, and occasional cobble-core tools and ground stone implements (Sutton, et al. 2007, p. 234; Warren 1984, p. 413). The assemblages primarily appear to represent temporary small camps and work stations. Infrequent accumulations of residential debris do indicate, however, that camps with longer use periods are also present.

The archaeological record of the Lake Mojave Period indicates that human populations during the Early Holocene were small, mobile groups practicing a hunting-and-foraging economy whereby groups shifted residency across the landscape among the most productive environmental zones as the resources in those zones became depleted over time (Bamforth 1990, p. 73; Lyneis and Macko 1986, p. 41).

Pinto Period (5000 to 2000 B.C.)

The evidence of human activity found in Pinto Period archaeological sites indicates a behavioral continuity with Lake Mojave Period developments (Warren 1984, p. 414). The Pinto Period witnesses the final desiccation of the Pleistocene pluvial lakes in the Mojave Desert and the adaptive transformation of local populations to the extreme aridity of the mid-Holocene Altithermal (see Antevs 1948). It is unclear whether the Pinto Period directly follows the Lake Mojave Period, or may represent a resumption of the desert's use after a hiatus during the worst of the mid-Holocene droughts (Warren and Crabtree 1986, p. 184). Pinto Period components are typically surface deposits that are small in area and do not include midden deposits, constituent residential debris of ash, charcoal, and food and other organic residues, although larger components with broader ranges of artifacts and substantial midden deposits have more recently been found (Sutton, et al. 2007, p. 238, Warren 1984, p. 413 and 414). Pinto Period components are generally found on the landscape in the same places as deposits of the Lake Mojave Period (Bamforth 1990, p. 72, Lyneis and Macko 1986, p. 41). The suggestion has been made that the components may actually overlap in time (Bamforth 1990, p. 73, Sutton, et al. 2007, p. 238).

The most important distinction between the artifact assemblages of the Pinto Period and those of the preceding Lake Mojave Period appears to be the relative abundance of ground stone implements or milling tools. More recent research has found milling tools to occur in moderate abundance in most Pinto Period deposits and, occasionally, in great frequency (Sutton, et al. 2007, p. 238). The characteristic Pinto Period assemblage includes large and small leaf-shaped projectile points and knives, domed and elongated keeled scrapers, several forms of well-made flake scrapers, flat millingstones, and manos. Drills, engraving tools, and *Olivella* spp. shell beads also occur (Sutton, et al. 2008, p. 238; Warren 1984, p. 412; Warren and Crabtree 1986, p. 187). The index artifact for the period is the stemmed, indented-base Pinto series projectile point, the Mojave Desert variety of which is markedly crude in form and manufacture (Warren 1984, p. 411). A broad continuity in the chipped stone technology evident in both the Lake Mojave and Pinto Periods has been noted. Populations during these periods appear to make extensive use of toolstones[19] other than cryptocrystalline silica or obsidian, and they also make regular use of unifacial and bifacial core tool forms (Sutton, et al. 2007, p. 238).

More recent research indicates that Pinto Period assemblages may reflect the emergence of a two-tier settlement pattern. The small temporary or seasonal camps that appear to have been the primary focus of Lake Mojave Period activity may have become more task-specific camps that were subordinate to more permanent residential base camps. The increase during the Pinto Period in the relative frequency of milling tools suggests a corresponding increase in the reliance of local populations on plant resources (Sutton et al. 2007, pp. 238–239).

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[19] Toolstone is a type of stone used to manufacture stone tools. Generally speaking, tools that require a sharp edge are made using cryptocrystalline materials that fracture in an easily-controlled conchoidal manner. Cryptocrystalline tool stones include flint, chert, rhyolite, and obsidian. These materials fracture in a predictable fashion, and are easily resharpened.

Gypsum Period (2000 B.C. to A.D. 500)

Gypsum Period artifact assemblages, though scarce relative to earlier and later periods, appear to evidence a shift in the economy of local populations toward a much greater dependence on plant resources (Bamforth 1990, p. 73; Warren 1984, p. 419). Period components are ephemeral in character, relatively more scarce in the southern and eastern portion of the Mojave Desert, smaller yet more numerous than components of the preceding periods, and found in more diverse locations on the landscape (Sutton, et al. 2007, p. 241).

Gypsum Period assemblages encompass a relatively broad array of artifact types. The index artifacts for the period include any combination of Gypsum (Gypsum Cave), Humboldt (Humboldt Concave Base), or Elko (Elko Eared, Elko Corner-notched) series projectile points (Sutton, et al. 2007, p. 241; Warren 1984, p. 414; Warren and Crabtree 1986, p. 187). The balance of period assemblages may include leaf-shaped projectile points; rectangular-based knives; flake scrapers; T-shaped drills; occasional large scraper-planes; choppers; hammerstones; manos and millingstones; mortars and pestles; shaft smoothers incised slate and sandstone tablets and pendants; fragments of drilled slate tubes; *Haliotis* spp. Rings; central California Middle Horizon bead and ornament types; *Olivella* spp. shell beads; and bone awls (Warren 1984, p. 418). The greater presence of quartz crystals, paint, split-twig figurines, and rock art also indicates the elaboration of ritual activity during this period (Warren and Crabtree 1986, pp. 188–189). The influence of the Anasazi archaeological culture of the Southwest is apparent in the eastern Mojave Desert toward the end of the Gypsum Period with the introduction of Anasazi ceramic types to period assemblages, and evidence of the replacement of the atlatl with the bow and arrow, as the larger Gypsum, Humboldt, and Elko series dart points give way to smaller Eastgate and Rose Spring arrow point types in the subsequent Saratoga Springs Period (Warren 1984, pp. 414–415).

The relative scarcity of Gypsum Period data complicates discussions of period settlement patterns in the Mojave Desert. Available data indicates that the focus of Gypsum Period components was lowland concentrations of plant resources along streams and in the lake basins (Bamforth 1990, p. 73; Sutton, et al. 2007, p. 241). One such resource may have been mesquite. The introduction of the mortar and pestle during this period and the use of these tools in the historic period to process mesquite pods have been taken to indicate that mesquite was first used in the Gypsum Period (Warren 1984, p. 419). Populations appear to have spent a substantial part of each year in residential base camps while dispatching task groups out to hunt (Bamforth 1990, p. 73). The presence of shell ornaments in the assemblages of the period also indicates the establishment of relatively routine trade with the southern California coast (Warren 1984, p. 419).

Saratoga Springs Period (A.D. 500 to 1200)

The artifact assemblages of the Sarasota Springs Period in the eastern Mojave Desert reflect the mixture of cultures that appears to have influenced the region.

Saratoga Springs Period assemblages encompass a broad, diverse array of artifact types, many of which appear to come from outside the region or reflect outside influences. The index artifacts for the period include Eastgate and Rose Spring

projectile points. The core of the period assemblage includes millingstones and manos, mortars and pestles, incised stones, and slate pendants (Warren 1984, p. 420). Other characteristic artifact types of the period include small triangular knives, scrapers, drills, hammerstones, choppers, pendants of green schist, and Pacific Coast shell ornaments, including *Olivella* Saucer beads, *Olivella* Barrel beads, and limpet rings (Warren 1984, p. 367). Anasazi grayware ceramics of the Basketmaker III through early Pueblo Periods (Pecos Classification, see Cordell 1984, pp. 55–58) are a notable element of the Saratoga Springs Period assemblage as well.

The archaeological data for the Saratoga Springs Period appear to indicate that local populations were developing broader spheres of interaction with outside groups, perhaps even allowing settlements of outsiders, in the context of a general continuity in local settlement patterns. The basic settlement pattern for the period appears not to change markedly from the Gypsum Period through to the Protohistoric Period (see below). The size of residential base camps and seasonal population dispersions to acquire more remote resources may both have been in slow decline however. The overexploitation of large mammals, due, in part, to the introduction of the bow and arrow during this period and to a deteriorating climate, may have led to a shift in hunting emphasis to small animals and reinforced the primary dependence of local populations on plant seed resources such as mesquite (Bamforth 1990, p. 74).

The Anasazi influence, presumably of the Virgin Branch (see Fowler and Madsen 1986, pp. 175–181), was marked in the eastern Mojave Desert during this period from at least A.D. 700 through A.D. 1150 (Warren 1984, pp. 373–373, 426–427). The distribution of Anasazi grayware ceramics, the key archaeological index of Anasazi influence, reaches from the lower Virgin River in southern Nevada into California as far west as the Cronise Basin in San Bernardino County. The primary focus of Anasazi influence in the vicinity of the proposed project area appears to have been the turquoise deposits in the area around Halloran Springs, roughly 30 miles southwest of the proposed project area. The sequence of ceramic types found at the turquoise mines in the area indicate that the period of Anasazi influence there was from approximately A.D. 700 to 900, during the Basketmaker III and Pueblo I Periods (Warren 1984, pp. 371–372). It remains unclear whether Anasazi peoples were actually in residence in the area (Warren 1984, p. 422) practicing the Virgin Branch horticultural lifeway, in residence living on stores of provisions, or not in residence and managing the extraction of turquoise through proxy labor. The Anasazi influence over the eastern Mojave Desert ultimately terminates around A.D. 1150 (Warren 1984, pp. 426–427).

Protohistoric Period (A.D. 1200 to present)

The speakers of Numic languages appear to displace the local populations of the eastern Mojave Desert at the outset of the Protohistoric Period, and to decisively eradicate Anasazi influence in the region (Warren 1984, p. 430).

The Protohistoric assemblage has been said to relate directly to the historic Paiute (Warren 1984, p. 427). The characteristic index artifacts for assemblages of the more northerly areas of the eastern Mojave Desert are Desert Side-notched projectile points and coarse, brownware ceramic types. The overall eastern Mojave assemblage strongly resembles assemblages across the northern Mojave Desert to Owens Valley and may

derive from that region. Assemblages from the more southerly areas of the eastern Mojave Desert include Cottonwood Triangular projectile points, in addition to Desert Side-notched points, and the ceramic assemblage includes types representative of the Hakataya archaeological culture, a cultural unit of the Lower Colorado River and the Colorado Desert. Among the Hakataya ceramics in the Protohistoric Period assemblages of the eastern Mojave Desert are brownwares, buffwares, and red-on-buff wares (Warren 1984, p. 427; Warren and Crabtree 1986, p. 191).

Despite the apparent shifts in the local populations in the eastern Mojave Desert and the ebb and flow of outside influences during the Sarasota Springs and Protohistoric Periods, the basic economic milieu and the settlement patterns of the local populations continue, in the Protohistoric Period, to reflect the trends in desert adaptation that had been developing in the Mojave Desert for millennia. Among the final elaborations to the local economy of the populations in the Mojave Desert may have been the addition, during the late Saratoga Springs Period and into the Protohistoric Period, of small gardens in preferred areas, the produce from which may have supplemented local diets in a minor way (Lyneis and Macko 1986, p. 41).

The influence of the Anasazi in the eastern Mojave Desert is supplanted by Hakataya influence from the Lower Colorado River and the Colorado Desert. Toward the end of the Saratoga Springs Period or the beginning of the Protohistoric Period around A.D. 1200, there is evidence of Hakataya influence or presence at the Halloran Springs turquoise mines lasting roughly a century. The Paiute have used the mines infrequently subsequent to the withdrawal of the Hakataya in about the fourteenth century (Warren 1984, p. 372 and 373).

Ethnographic Setting

The project area of analysis appears, on the basis of the available ethnographic literature, to fall in the ancestral territories of three major Native American groups, the Southern Paiute (Las Vegas Paiute and Pahrump Paiute), the Chemehuevi, and the Mojave. The Las Vegas Paiute, the Chemehuevi, and the Mojave made use of overlapping portions of the eastern Mojave Desert. The portions of the region that each group used and the ways that each group made use of those portions varied through time (Bean, Vane, and Young 1982:M-2). Brief discussions of the ethnography and the history of the Numic-speaking Southern Paiute and of the Mojave provide a transition for the cultural history of the region from late prehistory into the period of sustained European and Euroamerican contact and subjugation, and provides one context for the recognition and interpretation of ethnographic resources that may be in the project area of analysis.

Southern Paiute and Chemehuevi

The Southern Paiute peoples and the Chemehuevi, a closely related people, belong to the Southern Numic branch of the Uto-Aztecan language family. The territory of the Las Vegas Paiutes and the Pahrump Paiutes during the nineteenth century included an area from roughly Death Valley east to the Colorado River and from just north of present-day Las Vegas south to just north of the City of Needles, California. Chemehuevi territory during that period abuts the Las Vegas Paiute and Pahrump Paiute territory on the north

and runs south to approximately the City of Blythe, California, to the west of the Colorado River (Kelly and Fowler 1986:figure 1). The nineteenth-century territories of the Southern Paiute and Chemehuevi groups reflect the adaptation of each to their unique physical and political environments subsequent to the apparent entry of Numic-speakers into the region at approximately A.D. 1200 (see *Protohistoric Period* subsection above).

The economy of the Southern Paiute in general was largely one of subsistence. The particular variety of plant and animal resources used in the territory of each Southern Paiute group was dependent upon the mosaic of vegetation types found there. Major plant resources for the Las Vegas Paiute, the Pahrump Paiute, and the Chemehuevi included piñon nuts (*Pinus monophylla*), mesquite pods (*Prosopis juliflora*), and agave (*Agave utahensis*). A variety of seed resources were a lesser, although important food source (Kelly and Fowler 1986:370).

The chief source of protein for Southern Paiute groups was small game. Such game included rabbits, wood rats, mice, gophers, squirrels, chipmunks, and birds. Lizards, snakes, chuckwalla, and tortoise were also eaten, as were insect resources such as locusts, ant larvae, and caterpillars. Large game resources such as antelope and mountain sheep were supplementary protein sources.

Southern Paiute foraging and collecting schemes were supplemented in the late Protohistoric and early historic periods with floodplain and, apparently, irrigation agriculture. Typical cultigens, variously introduced from the North American Southwest, Mexico, and the lower Colorado River , included maize, squash, pumpkins, gourds, and, less frequently, beans. Other cultigens appear to be more local domesticates that came from the Mojave, and introduced European cultigens ultimately became more significant crop resources (Kelly and Fowler 1986:370).

The sociopolitical organization of the Southern Paiute groups did not include organs of central political control. The boundary for each group appears to have been relatively fluid and permeable. Groups were essentially clusters of individual households that variously coalesced and dispersed during the year to facilitate different economic pursuits. Favored residence locations adjacent to springs or agricultural plots were held as private property and subject to inheritance. Large household clusters often had a headman, whose authority was more advisory than authoritative (Kelly and Fowler 1986:380).

Mojave

The Mojave belong to the River branch of the Yuman language family (Kendall 1983). The core ancestral territory of the Mojave, possibly established as early as A.D. 1150, appears to have been what is now known as the Mohave Valley along the lower Colorado River. By the mid-nineteenth century, Mojave territory expanded to run along the lower Colorado River from roughly 25 miles north of Bullhead City, Arizona south to roughly 5 miles north of the City of Blythe, California (Stewart 1983:55).

The primary focus of the Mojave economy was agriculture. The group farmed the floodplain of the Colorado River relying on the annual overflow deposition of silt and

organic matter to rejuvenate soil fertility. The principal crop was maize with Tepary beans, pumpkins, and melons being secondary cultigens (Stewart 1983:57 and 58).

The Mojave supplemented their agricultural pursuits with the foraging and collecting of wild plant resources, with fishing along the Colorado River, and, to a lesser degree, with hunting. Commonly used plant resources included a variety of seed plants, cactus fruit and other desert plants from the mesas adjacent to the river, and the pods of both mesquite (*Prosopis juliflora*) and screwbean (*Prosopis pubescens*) (Stewart 1983:57 and 59).

Fish was the primary source of meat for the Mojave. Fishing was typically done with dip nets, seines or drag nets, traps or weirs, or large, canoe-shaped basketry scoops with long handles along the Colorado River, or in muddy side sloughs or ponds (Stewart 1983:59).

Hunting was of relatively minor significance to the economy of the Mojave and was, as a consequence, less well developed as a cultural skill than among other adjacent groups out in the desert (Stewart 1983:59).

The Mojave may be thought of as a tribe (see Service 1962). They appear to have and to continue to regard themselves as one people. The tribe appears to be divided into three bands or more local groups, the northern, central, and southern divisions. Historically, each band was, in turn, further divided into settlements that were sprawling clusters of residences on low floodplain knolls adjacent to arable land. The nucleus of each settlement was an extended family. Each settlement appears to have had a group leader, and each band appears to have had one or several subchiefs. The tribe as a whole had a head chief, but the longevity of this position of status, prior to the arrival of the Europeans, is uncertain. Authority among the Mojave was derived from the ongoing consensus of subordinate tribal members. There was also only a minimal or incipient development of tribal political institutions (Stewart 1983:57 and 62).

<u>Historic Setting</u>

Roads

Much of the important history of the Mojave Desert took place beyond the proposed project area. The historic period of the region begins in 1776 with the travels of Francisco Garces between the Colorado River and the Mission system of coastal California. He became the first European to cross the Mojave Desert. His route followed the Native American trails (Mojave Trail) between the Needles area on the Colorado River, across to the Mojave River, and then through the Cajon Pass.

During the time of Mexican sovereignty in the area, in 1826 and again in 1827, Jedediah Strong Smith crossed the Mojave Desert via the Mojave Trail, both times traveling from east to west only. Smith was followed by early travelers to the region such as Ewing Young in 1829. Kit Carson was a notable member of Young's party. The Antonio Armijo party of 1829-30 was the first to complete a trip between Santa Fe and Los Angeles and the first known to have traveled a different route across the Mojave Desert. This route, a more northerly route, connected Las Vegas, Resting Springs, the Amargosa River, Salt Creek, and Bitter Springs with the Mojave Road near present-day Daggett. John C.

Fremont traveled this route in 1844. While it is a matter of debate whether or not the Amargosa River Route was the trail of the Spanish caravans, known as the Old Spanish Trail, it became the preferred route of travel between Salt Lake City and San Bernardino, connecting two distant Mormon communities following the War with Mexico in 1846.

Following the discovery of gold in California in 1848 and California statehood in 1850, increased traffic occurred in the Mojave Desert, much of it along the Old Spanish Trail or Mormon Road. Alterations to the Old Spanish Trail occurred after the discovery of the Kingston Cut-off in 1855 as well as other "short-cuts." These two routes, the Mojave Road, and the Old Spanish Trail or Mormon Road, were the primary nineteenth-century transportation routes through the Mojave Desert prior to the construction of railroads in the region (Warren, Knack, and Warren 1980; Warren and Roske 1981).

Mining

In addition to transportation routes, another major historic theme in the Mojave Desert during the American period (post-1846) was mining. A party of Mormons, led by Jefferson Hunt, discovered gold in the Salt Creek area, approximately 44 miles west of the proposed project area, in December of 1849. Sporadic attempts at mining in the Salt Creek area, as well as in other areas of the Mojave Desert and the San Bernardino Mountains, were hampered by ongoing conflicts with local Native American groups, who resisted the invasion of their respective territories.

Killings of miners resulted in a series of American military expeditions into the Mojave Desert around 1860 and led to the establishment of a number of military posts to the south of the proposed project area (Fort Cady, Hancock's Redoubt at Soda Springs, Rock Springs, and Fort Paiute). In addition, military posts were located in the San Bernardino Mountains in the 1850s at Cajon, Jurupa, and Rancho del Chino (Beck and Haase 1974).

In the 1860s prospectors fanned out over the Mojave Desert looking for another Sutter's Mill or Comstock Lode, resulting in the discovery of ore in the Clark Mountain Range, and in the Providence, New York, Whipple, Turtle, and Sacramento Mountains, as well as important silver deposits near Tecopa Pass. Most of these discoveries were made within two days' travel of major transportation routes. Between 1870 and World War I, mining activity continued and gold mining surpassed silver mining in the 1890s.

Precious metals were not the only commodity that was mined near the turn of the twentieth century. Large deposits of borates were discovered in the Calico area (Borate) and in and around Death Valley. Nitre was mined 15–20 miles north of the proposed project area near the turn of the twentieth century, as were gypsum and talc (Vredenburgh, Shumway, and Hartill 1981).

Railroads

By the beginning of the twentieth century, mining interests in the Amargosa Basin saw a need to provide better transportation for minerals and ore to the markets. Rail transportation along the Old Government Road (Mojave Road) had been open since 1883 with the completion of the Atlantic and Pacific Line (Santa Fe Railroad). By 1905 a second rail line bisected the Mojave Desert with the construction of the San Pedro, Los

Angeles, and Salt Lake Line (Union Pacific). William T. Coleman of San Francisco had developed the Harmony Borax Works using 20-mule teams to haul the deposits across the Mojave to the town of Mojave on the Southern Pacific Railroad.

In 1888 Coleman's borax properties, the Lila C. and the mines at Borate (Calico), passed to Francis M. "Borax" Smith who had found borates at Teel's Marsh in Nevada. In 1890 Smith combined all three properties to form the Pacific Coast Borax Company. Exhausting the supply at Teel's March, Smith moved operations to Calico. By 1900 the rich deposits at Calico began to give out, and Smith turned his attention to his property near Death Valley.

After a failed attempt in April 1904 to move his ore from the Lila C. mine near Death Valley to the California Eastern Railroad at Ivanpah, 100 miles to the south, via a rock-base wagon road, Smith conceived of a new railroad bisecting the Mojave Desert north to south. On July 19, 1904, he incorporated the Tonapah and Tidewater Railroad Company. Surveys were conducted for several alternate routes, and contracts were arranged. Following conversation with Montana Senator William A. Clark in Nevada, a route was chosen between Las Vegas and the Lila C. The construction of the railroad started in Las Vegas in the spring of 1905. By August it became clear that Senator Clark was building his own railroad to the Tonapah-Goldfield area to provide rail transportation for the newly found gold and silver mines in that area.

After talks with the Santa Fe Railroad, Smith altered his route, and by the latter part of 1905 a tent city had been established at Ludlow to begin the new railroad which was planned to extend 167 miles north to the goldfields, with a branch line cutting over to the Lila C. Smith envisioned a railroad from Tonapah, Nevada, to the tidewater at San Diego, hence the name. On November 19, 1905, the first tracks were laid on the T&T's loop out of Ludlow, and by May of 1906 the rail line extended for 75 miles to just beyond Dumont. Engineering problems slowed construction to Tecopa (Inyo County) due to the twelve mile Amargosa Canyon segment, but a year later trains were operating all the way to Tecopa. In June 1907 the rail line extended to Zabriskie, where wagon-hauled ore from the Lila C. was loaded for the 91-mile trip to Ludlow. Eighteen additional miles were completed to Evelyn by mid-July of that year. On August 16, 1907, the seven-mile branch line from the Lila C. connected with the T&T at Death Valley Junction. Additional construction extended the T&T to Gold Center, Nevada, the end of the line, on October 30, 1907. Smith made arrangements with the recently completed Bullfrog Goldfield Railroad to connect to the T&T and to use the Bullfrog track from Gold Center, north to Beatty, and west to Bullfrog and Rhyolite.

A spur line was constructed to China Ranch to facilitate gypsum and talc shipping in 1915 in the Willow Wash or China Ranch Wash. The T&T railroad was abandoned in 1940 when the rails were removed to support the war effort. Many of the ties were taken to Barstow and used in the construction of the El Rancho Motel (Myrick 1992). An unconfirmed report by Pat Mitchell (1994, personal communication), grazing allottee at Horse Thief Springs, indicates that the railroad tie-constructed cabin or house at Horse Thief Springs was also built of T&T railroad ties.

Hydroelectric Power Generation and Electric Power Transmission

The eastern Mojave Desert has been the major corridor for the transmission of hydroelectric power from Hoover Dam, roughly 51 miles to the northeast of the project site, to Los Angeles, approximately 244 miles to the southwest, since 1936. Hoover Dam and the electric transmission system that distributes the hydroelectric power that it produces underwrote much of the economic development of the West in the twentieth century and were particularly critical to the economic development of southern California during that period (Solar Partners I et al. 2008f:6).

Hoover Dam

Congress authorized the construction of Hoover Dam through the passage of the Boulder Canyon Project Act of 1928. The act was a response to both an increase in the regional demand for electric power and a desire to affect better flood control along the Colorado River. Construction of the dam began in 1931, and the dam structure itself was completed in 1935. The construction of the hydroelectric powerhouse and the installation of the first turbines took another year. The powerhouse went into operation in 1936. The installation of the balance of the turbines in the facility was completed in 1939. The original output of the powerhouse in 1939 was 700 MW, making it the largest hydroelectric facility in the world at that time (Solar Partners I et al. 2008f:5 and 6).

Hoover Dam Transmission System

Transmission systems were needed to power the construction of Hoover Dam and to distribute the hydroelectricity that it would ultimately generate. The design of the Boulder Canyon Project Act was for the Federal government to build the dam and the powerhouse and to supply the turbines. Power contractors were then to lease the turbines from the government, pay the government for the use of the pooled water, and to themselves supply the electric transmission lines for the distribution of the generated electricity. The government, however, first had to supply a transmission line to power the construction of the dam. Southern Sierras Power Company, subsequently the California Electric Power Company, won the contract to build that initial transmission line and did so in 1930 and 1931. A second contractor, the Interstate Telegraph Company, built a telephone line in 1931 that was necessary to the operation of the Southern Sierras Power Company transmission line. The California Electric Power Company reversed the direction of the transmission line in 1937 to begin delivery of electricity from Hoover Dam to the City of San Bernardino (Solar Partners I et al. 2008f:6 and 7).

4.4.2 Environmental Consequences

Methodology

Regulatory Context

The NHPA requires the BLM to evaluate resources for eligibility for listing on the NHRP. These evaluations then influence the analysis of potential impacts to the resources and the mitigation that may be required to ameliorate any such impacts. The criteria for eligibility of listing on the NRHP are specified in 36 CFR 60.4. NRHP sites are those

where the quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and

a) that are associated with events that have made a significant contribution to the broad patterns of our history; or
b) that are associated with the lives of persons significant in our past; or
c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
d) that have yielded, or may be likely to yield, information important in prehistory or history.

Whether a proposed project would cause a substantial adverse change in the significance of historical resources is the issue that BLM analyzes to determine if the project may have an adverse effect on the environment. The significance of an impact depends on:

- The cultural resource impacted;
- The nature of the resource's historical significance;
- How the resource's historical significance is manifested physically and perceptually;
- Appraisals of those aspects of the resource's integrity that figure importantly in the manifestation of the resource's historical significance; and
- How much the impact will change those integrity appraisals.

The development of the inventory of historical resources in and near the proposed project area is the requisite first step in the assessment of whether the project may, cause a substantial adverse change in the eligibility of a historical resource, and may, therefore, have a significant effect on the environment. The effort to develop the inventory has involved conducting a sequence of investigatory phases that includes doing background research, consulting with local Native American communities, conducting primary field research, interpreting the results of the inventory effort, as a whole, and evaluating whether found cultural resources are eligible.. This section discusses the methods and the results of each inventory phase, develops the historical resources inventory for the analysis of the proposed project, and interprets the inventory to assess how well it represents the archaeology of the project area of analysis.

The project area of analysis is the geographic area in which the construction and operation of the proposed project may have the potential to directly and indirectly impact cultural resources. For the purpose of the present analysis, this geographic area includes the project site, which is the footprint of the concentrating solar power electric generation facility alternatives, the broader project area, which is the area that encompasses the project site and ancillary facilities, such as natural gas pipelines,

water pipelines, transmission infrastructure, and access roads requisite to the operation of the generation facility, and areas beyond the project area where the project may visually intrude on cultural resources.

Historical Resources Inventory

The development of the inventory of historical resources in and near the proposed project area is the requisite first step in the assessment of whether the project may cause a substantial adverse change in the significance of a historical resource, and may, therefore, have a significant effect on the environment. The effort to develop the inventory has involved conducting a sequence of investigatory phases that includes doing background research, consulting with local Native American communities, conducting primary field research, interpreting the results of the inventory effort, as a whole, and evaluating whether found cultural resources are historically significant. This section discusses the methods and the results of each inventory phase, develops the historical resources inventory for the analysis of the proposed project, and interprets the inventory to assess how well it represents the archaeology of the project area of analysis.

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Background Research

The background research for the present analysis employs information that the applicant and the BLM gathered from literature and record searches, and information that the BLM staff gathered as a result of consultation with local Native American communities and with other potential public interest groups. The purpose of the background information is to help formulate the initial cultural resources inventory for the present analysis, to identify information gaps, and to inform the design and the interpretation of the field research that will serve to complete the inventory.

Literature and Records Search

The literature and records search portion of the background research attempts to gather and interpret documentary evidence of the known cultural resources in the project area of analysis. The sources for the present search include the San Bernardo Archeological Information Center (SBAIC) of the California Historical Resources Information System (CHRIS), and the BLM Needles Field Office.

CHRIS Search

Methods

CH2M HILL, the cultural resources consultant to the applicant, requested a records search from the SBAIC on June 21, 2007 (CH2M Hill 2007, App. 5-3C). The record search was limited to the area within a one-mile radius around the project site and 0.25 miles to each side of the linear infrastructure proposed for the project. The search returned information on the known inventory of prehistoric and historical archaeological resources, built-environment resources, cultural landscapes, traditional cultural resources, and the heritage resources for which designations of significance already exist, that fell within the defined search area. The search also provided information on the technical reports for the previous archaeological surveys that have taken place wholly or partly within 0.25 miles of the area subject to archaeological survey for the present analysis, and for the archaeological excavations and built-environment surveys that have taken place in the records search area. The CHRIS records search also accessed the *Survey of Surveys: A Summary of California's Historical and Architectural Resource Surveys* (1986), the *Five Views: An Ethnic Sites Survey for California* (1988), the listed California Historical Landmarks and California Points of Historical Interest, and the California Office of Historic Preservation's Determinations of Eligibility and Directory of Historic Properties.

Results

The SBAIC record search found that 21 investigations, 20 pedestrian surveys, and one ethnographic study, had been wholly or partially conducted in the record search area between 1978 and 1995 (**Table 4.4-2**).

Table 4.4-2
Previous Cultural Resources Investigations in the Records Search Area

Type of Investigation	Number of Investigations of Type	Dates of Investigations	CHRIS Document Nos.
Linear pedestrian electric transmission line surveys	8	Late 1970s to mid1990s	1060614, 1060763, 1060764, 1060874, 1061280, 1061479, 1062170, 1063668
Areal pedestrian survey to inventory California desert area archaeological site types	1	Late 1970s	1062218
Linear and areal pedestrian surveys for the ISEGS project	2	Early 1980s	1061156, 1061219
Ethnographic Study for the ISEGS project	1	Early 1980s	1061220
Linear pedestrian motorcycle race course survey	1	Early 1980s	1061381

Type of Investigation	Number of Investigations of Type	Dates of Investigations	CHRIS Document Nos.
Linear and areal pedestrian surveys for drilling areas and associated access roads	2	Mid-1980s	1061599, 1061605
Areal pedestrian parcel surveys	2	Mid-1980s	1061602, 1061612
Linear pedestrian fiber optic cable surveys	2	Late 1980s	1061613, 1061734
Linear pedestrian natural gas pipeline surveys	2	Late 1980s to early 1990s	1062211, 1062571

The total survey coverage in the project area that is the result of these previous investigations is roughly 242 acres or 6 percent.

While eight cultural resources are known for the record search area (**Table 4.4-3**), only one is located in the project area of analysis, the Hoover Dam-to-San Bernardino Transmission Line (CA-SBR-10315H), originally built as a 132-kV line and presently operating as a 115-kV line.

Table 4.4-3
Previously Recorded Cultural Resources in the Records Search Area

Resource Designation No.	Description	Approximate Distance and Direction to Project Area
CA-SBR-816, 2341	Rock shelter	1.0 miles NW of Ivanpah No. 3
CA-SBR-2342	Rock shelter	1.0 miles NW of Ivanpah No. 3
CA-SBR-6956	Rock shelters and milling features	0.85 miles NW of Ivanpah No. 3
CA-SBR-7347H	Dirt road, two-track with low side berms	0.5 miles WSW of Ivanpah No. 1
CA-SBR-7689H	Arrowhead Trail Highway (State Route 31)	0.6 miles E of Ivanpah No. 1, within Modified I-15 Alternative
CA-SBR-7694H	Boulder Transmission Lines 1, 2, and 3	0.8 miles N of Ivanpah No. 3
CA-SBR-10315H	Original 132-kV transmission line from the City of San Bernardino to the Hoover Dam, now known as the Eldorado-Baker-Coolwater-Dunn Siding-Mountain Pass 115-kV transmission line	Between Ivanpah No. 1 and Ivanpah No. 2
CA-SBR-10803H	Stock-loading facility with ancillary improvements	0.5 miles E of Ivanpah No. 1, within Modified I-15 Alternative

BLM Needles Field Office NEPA Document

Native American Consultation

The BLM has consulted with the Native American groups that may have an interest in the project area. The BLM is conducting the ongoing Native American consultation for the proposed project. The results of that consultation, to date, are found here.

Methods

CH2M HILL, the consultant to the applicant, contacted the California Native American Heritage Commission (NAHC) on June 27, 2007 to request that the NAHC search its Sacred Lands File to determine whether there are any reported Native American cultural resources in the project area of analysis, and to request that the NAHC provide a list of Native American contacts that may have knowledge of cultural resources in that area. On June 29, 2007, CH2M HILL, on the basis of the response from the NAHC, sent out letters to initiate correspondence with the Native American groups that the NAHC thought may have an interest in the project area (CH2M Hill 2007, p. 5.3-21 and appendix 5.3A; **Table 4.4-4**).

The BLM has also sought to engage Native American groups beyond those on the NAHC contact list that may have an interest in the lands in the project area of analysis and with which BLM maintains ongoing relationships (5.4-7). BLM Needles Field Office staff sent out letters initiating consultation with potentially affected tribes on October 4, 2007. On December 6, 2007, BLM submitted additional letters to the balance of the groups that the NAHC thought may have an interest in the project area. The purpose of the BLM letters was to initiate formal Federal contact with Native American groups about the proposed project and to initiate government-to-government consultation with those groups that are federally recognized. BLM Needles Field Office staff sent out a subsequent letter on March 5, 2009 to the recipients of its initial letter to inform them of the discovery of ISEGS-01, an archaeological site to the east of the project site (see "May 23, 2008 Pedestrian Reconnaissance Survey of Project Area Inselbergs" and "Investigation to Evaluate Archaeological Site ISEGS-01" subsections, below), to solicit input on and concerns about the new archaeological site, request information on any cultural or religious values that might be affected by the proposed project, and to inform them that the results of additional archaeological survey on the hills that flank the project site would be made available to them on request. On December 16, 2009, BLM submitted the Draft EIS to all of the Tribes. On April 16, 2010, BLM submitted the Supplemental Draft EIS to potentially affected Tribes.

Results

The June 29, 2007 response of the NAHC to the above request says that the Sacred Lands File did not indicate any Native American cultural resources in the immediate project area and provides a list of Native American contacts (**Table 4.4-4**). CH2M HILL mailed and emailed letters to each of the contacts on the June 29 list asking them to please contact the consultant if they had any knowledge of traditional cultural properties or areas of traditional cultural value in the project area, or if they had any concerns about the proposed project. As of August 13, 2007, the month of the filing of the AFC for the proposed project, CH2M HILL had received no responses to the letters sent out on June 29 (CH2M Hill 2007, p. 5.3-21 and appendix 5.3A).

BLM Needles Field Office staff has had little response from any of the Native American Tribes to any correspondence. BLM Native American consultation efforts are ongoing. BLM was contacted by the Fort Mojave Indian Tribe on October 21, 2009. He stated that the Chemehuevi used to live in and use the mountains surrounding the Ivanpah Valley for hunting and collecting, that the spring was named "Ivanpah" meaning 'good

water' in Chemehuevi (not near the project area) and that he wanted to be included on future mailings.

The Chairman of the San Fernando Band of Mission Indians contacted the BLM by phone. His call was returned on May 4, 2010. He wanted to know if the project lands had been surveyed and if any prehistoric or Tribal sites had been found. He was assured that only historic period sites had been identified to date and that he would be informed if any were identified. His concern was that prehistoric sites indicating tribal activity might be destroyed.

On May 13, 2010, the Colorado River Indian Tribes identified Tribal concerns over the use of water for the project as water is in important resource to the Tribes.

Table 4.4-4
(CH2M Hill 2007, Appendix 5.3A) NAHC Native American Contact List

Native American Group	Location of Group Contact	Federal Recognition
Cahuilla Band of Mission Indians of the Cahuilla Reservation	Community of Anza, Riverside County	Yes
Ramona Band of Cahuilla Mission Indians of California	Community of Anza, Riverside County	Yes
San Manuel Band of Serrano Mission Indians of the San Manuel Reservation	City of Highland, San Bernardino County	Yes
Chemehuevi Indian Tribe of the Chemehuevi Reservation	Chemehuevi Valley, San Bernardino County	Yes
AhaMaKav Cultural Society, Fort Mojave Indian Tribe	Mohave Valley, Mohave County, Arizona	n/a
Morongo Band of Cahuilla Mission Indians of the Morongo Reservation	City of Banning, Riverside County	Yes
Fort Mojave Indian Tribe of Arizona, California, and Nevada	City of Needles, San Bernardino County	Yes
Serrano Nation of Indians	City of Highland, San Bernardino County	No
San Fernando Band of Mission Indians	Community of Newhall, Los Angeles County	No

Table 4.4-5
BLM Needles Field Office List of Additional Native American Contacts

Native American Group	Location of Group Contact	Federal Recognition
Colorado River Indian Tribes of the Colorado River Indian Reservation	City of Parker, La Paz County, Arizona	Yes
Las Vegas Tribe of Paiute Indians of the Las Vegas Indian Colony	City of Las Vegas, Clark County, Nevada	Yes
Pahrump Paiute Tribe	Town of Pahrump, Nye County, Nevada	No

Consultation with Others

CH2M HILL made telephone calls to the San Bernardino Historical and Pioneer Society in the City of San Bernardino on June 27, 2007, in an attempt to reach Steve Shaw, President, and to the Nevada State Museum and Historical Society in Las Vegas on June 28, 2007, in an attempt to reach David Millman, Curator of Collections (History). Voicemails were left for both. As of August 13, 2007, the month of the filing of the AFC for the proposed project, CH2M HILL had received no responses (CH2M Hill 2007, p. 5.319).

Cultural Resources Distribution Models

One critical use of the information drawn together during the background research for a cultural resources analysis is to inform the design and the interpretation of the field research that will complete the cultural resources inventory for the analysis. The background research for the present analysis has identified one previously recorded cultural resource on the project site, CA-SBR-10315H (see *California Historical Resources Information System Search* subsection above), and found that more than 95 percent of the project area has never been subject to cultural resources survey. A further role of background research is to help develop predictive or anticipatory models of the distribution of cultural resources across a project area of analysis. Such models of the types of archaeological, ethnographic, and built-environment resources, and the patterns of their distribution across and beneath the surface of the landforms of the project area of analysis, provide the means to tailor more appropriate research designs for the field investigations that will complete a cultural resources inventory, and help gauge the degree to which the results of those investigations may reflect the actual population of archaeological, ethnographic, and built-environment resources in the project area of analysis. Such models also provide important contexts for the ultimate interpretation of the results of those investigations.

Models of the distribution of prehistoric archaeological sites, of ethnographic resources, and of historical archaeological sites and built-environment resources are developed here and draw on information above in the “Environmental Setting,” “Prehistoric Setting,” “Ethnographic Setting,” and “Historic Setting” subsections, in addition to the above information in the “Background Research” subsection. BLM formulated data needs during the initial phases of the analysis on the basis of these models to ensure the collection of enough information to factually support the conclusions of this analysis. The discussions in the “Interpretation of Results” subsection below also employ the models.

Model of Prehistoric Archaeological Resources

The analysis of the information in the “Environmental Setting,” “Prehistoric Setting,” and “Literature and Records Search” subsections leads to the conclusion that subsurface prehistoric archaeological deposits are unlikely to be present in the project area and that the likelihood of prehistoric archaeological deposits across the surface of the project area is generally low.

The age of the constituent sedimentary deposits that make up the project area landform, the bajada, and the geomorphic processes that have been actively shaping it

constrain the age and the physical integrity of the surface and subsurface archaeological deposits that may be present there. The subsurface portion of the bajada appears to have been formed between approximately 8,700 and 4,000 years ago. Processes of erosion appear to have been reworking the sedimentary deposits of the bajada over the course of the last 4,000 years (see "Historical Geomorphology" subsection, above).

Subsurface archaeological deposits that may be present in the project area would include cultural materials from the time range of 8,700 to 4,000 years ago that would have been left on former bajada surfaces and then buried during the most recent cycle of sedimentary deposition on the middle and lower slopes of the bajada. This time range corresponds to the late Lake Mojave Period (10,000 to 5000 B.C.) and the Pinto Period (5000 to 2000 B.C.) (see "Prehistoric Setting" subsection, above). Lake Mojave and Pinto Period deposits are typically small, rather sparse accumulations of stone tools and stone tool manufacturing debris that are found in the vicinity of high terraces above or on relict shorelines along what are now playas. The portions of archaeological sites or components that date to this time range and largely represent temporary small camps and work stations are also found along relict stream channels. As the terraces and shorelines of Ivanpah Dry Lake are lower down on the bajada beneath the proposed project area, and as the ephemeral washes that course over the present surface of the project area are not the type of relict stream channels that would have held more perennial water sources in prehistory, the presence of subsurface Lake Mojave and Pinto Period archaeological deposits in the project is unlikely.

Archaeological deposits that may be present on the surface of the proposed project area would include cultural materials that date from 4,000 years ago to the present. Deposits of this age may survive with physical integrity on the more stable patches of the surface of the bajada, or have no physical integrity due to the erosion and re-deposition of the original deposits in ephemeral stream channels and over the adjacent channel banks. The time range for most surface archaeological manifestations would correspond to the Gypsum (2000 B.C. to A.D. 500), Saratoga Springs (A.D. 500 to 1200), and Protohistoric (A.D. 1200 to present) Periods. Gypsum Period components are ephemeral in character and are relatively scarcer in the vicinity of the project area. The basic settlement pattern from the Gypsum through the Protohistoric Period appears to demonstrate a focus on lowland concentrations of plant resources along streams and in the lake basins. Despite considerable evidence of outside (Virgin Anasazi and Hakataya) influence in the region during the Sarasota and Protohistoric Periods, the basic economic milieu and the associated settlement patterns reflect the ongoing local trends in desert adaptation that had been in place for millennia. As the stream and lake basin environments that would have been conducive to the development of plant resource concentrations in the Gypsum through Protohistoric Periods do not appear to have been present in the project area, modern vegetation associations having been in place by approximately 4,500 years ago (see "Paleoecology" subsection above), the presence of period surface deposits is unlikely.

The results of the CHRIS records search notes three prehistoric archaeological sites in the vicinity of the proposed project area, CA-SBR-816 (-2341), CA-SBR-2342, and CA-SBR-6956, and none in it. The three sites are rock shelters, one of which includes

milling features, which lie approximately 0.85 to 1.0 miles to the northwest and approximately 160 feet above the project area at the base of the Clark Mountain Range.

Model of Ethnographic Resources

The available information on the types of ethnographic resources that would be or are characteristic of the Southern Paiute or Mojave groups are too general and too spare to develop a useful predictive model about the resources that may be present in the project area of analysis. The study by Bean, Vale, and Young (1982) indicates that, in the vicinity of the proposed project area, known ethnographic areas of value include playa edges such as those around Ivanpah Dry Lake, grinding rock and roasting pit sites at Mountain Pass roughly eight miles to the southwest of the project site, piñon stands in the New York Mountains on the southeastern margin of Ivanpah Valley, and turquoise deposits in the Clark Mountain Range and in the vicinity of Turquoise Mountain roughly 30 miles to the west-southwest of the project site (Bean, Vale, and Young 1982:6-6–6-39). The identification of ethnographic resources for the present analysis must rely on efforts to identify ethnographic resources in the field and on further Native American consultation.

Model of Historical Archaeological and Built-Environment Resources

The analysis of the information in the “Environmental Setting,” “Historic Setting,” and “Literature and Records Search” subsections leads to the conclusion that subsurface historical archaeological deposits are most likely not present in the project area and that historical archaeological deposits and built-environment resources are likely present in low to moderate frequency across the surface of the project area.

As the subsurface portion of the bajada is 8,700 to 4,000 years of age and the surface of it has been subject to erosive forces for the last 4,000 years (see “Historical Geomorphology” subsection, above), there is almost no chance that buried historical archaeological deposits exist in the project area that are not detectable from the surface. Constructed subsurface features, such as basements, cellars, and trash and privy pits, would have been dug into the eroding surface of the bajada and would still be apparent today.

Historical archaeological deposits and built-environment resources that may be present on the surface of the proposed project area could hypothetically include cultural materials that date from the mid-nineteenth century to the present, the principal period of the historic use of the project area (see “Historic Setting” subsection, above). Historical archaeological deposits would be present with physical integrity on the more stable patches of the surface of the bajada or have no physical integrity due to the erosion and re-deposition of the original deposits in ephemeral stream channels and over the adjacent channel banks. Surface deposits of historical archaeological materials that retain physical integrity, or primary deposits, would most likely relate to debris that was the result of the moderately heavy use of transportation routes from the floor of Ivanpah Valley to the mines in the Clark Mountain Range, to the west of the project area, and of transportation routes through the valley, parallel to its long axis. Evidence of such materials and of the actual transportation routes are moderately likely to be present in the project area, as are secondary deposits (deposits that lack physical

integrity) of mining-related refuse that has washed down from the mountains and that now lie in and adjacent to ephemeral stream channels. Other historical archaeological materials and built-environment resources that may be present at lower frequency include resources related to ranching, homesteading, local industry, and the development of the utility infrastructure of the region.

The results of the CHRIS records search support the above conclusion. The records search notes five historical archaeological sites and built-environment resources in the vicinity of the proposed project area, including three that fall inside one or more alternatives (CA-SBR-10315H, CA-SBr-7689/H and CASBR-10803H). These resources include a segment of a dirt road (CA-SBR-7347H), a segment of former State Route 31, or the Arrowhead Trail Highway (CA-SBR-7689H), portions of two utility corridors, operational and abandoned (CA-SBR-7694H and CA-SBR-10315H), and a livestock loading facility (CASBR-10803H).

Cultural Resources Inventory Fieldwork

The field efforts to identify the cultural resources in the proposed project area of analysis include a geoarchaeology study, two reconnaissance surveys, and two intensive surveys (**Table 4.4-6**). Three new cultural resources have been found in the project area of analysis, not including the discovery of six isolate resources, and one previously known cultural resource has been re-recorded (**Table 4.4-7**). On the basis of background research and the results of the field efforts, the total cultural resources inventory for the project area of analysis includes one archaeological resource, no ethnographic resources, and three built-environment resources.

Table 4.4-6
Cultural Resources Inventory Investigations for the Present Analysis

Investigation Type	Results	Report Reference
Geoarchaeology Study	Conclusion that surface and subsurface potential for archaeological remains is negligible	pp. 9–18, CH2M Hill 2008j
Primary Intensive Pedestrian Cultural Resources Survey	Relocated one built-environment resource; found two new built-environment resources and six isolated artifacts	Fergusson 2007
Supplemental Intensive Pedestrian Cultural Resources Survey	No cultural resources found	Fergusson 2007
May 23, 2008 Pedestrian Reconnaissance Survey of Project Area Inselbergs	One archaeological resource found	Energy Commission staff field notes
September, 2008 Helicopter and Pedestrian Reconnaissance Survey	No Native American traditional use areas found	Helton, Lawson, and Spaulding 2008; Lawson, Helton, and Spaulding 2008
August, 2009 Cultural Resources Reconnaissance Survey for Ivanpah I-15 Alternative	Relocated three historic period resources and identified four historic period resources	McDougall and Horne 2009

Table 4.4-7
Present Inventory of Cultural Resources in the Project Area of Analysis

Cultural Resource Type (Year of Initial Recordation)	Description	Location	National Register of Historic Places (NRHP) Status	Siting Case Report Reference
Historic Built-Environment Resources				
CA-SBr-7689/H (1993)	Arrowhead Highway	Sec. 12, 16N., R14E., I-15 alternative	Consensus determination (6y) as ineligible for the NRHP (2/16/94, 11/04/05 & 12/08/05)	McDougall & Horne 2009
CA-SBR-10315H (1988)	Hoover Dam-to-San Bernardino transmission line, now known as the Eldorado-Baker-Coolwater-Dunn Siding-Mountain Pass 115 kV transmission line	Sec. 3, T. 16 N., R. 14 E., Between Ivanpah No. 1 and Ivanpah No. 2	Consensus determination (2S2) as individually eligible for the NRHP (10/22/93), and therefore listed on the California Register of Historical Resources (CRHR)	Fergusson 2007
CA-SBr-10803H (2005)	Remains of Stateline well and corral/stock loading facility	Sec 11 & 12, T16N., R14E., I-15 Alternative	Consensus determination (6y) as ineligible for the NRHP (11/04/05	McDougall & Horne 2009
CA-SBr-10806H (2005)	Segment of the Ivanpah-Providence Road	Sec. 14, T16N., R14E., I-15 alternative	Consensus determination (6y) as ineligible for the NRHP (11/04/05	McDougall & Horne 2009
CA-SBR-12574H (2007)	Dismantled telephone line and dirt road, two - track	Sec. 3 and 4, T. 16 N., R. 14 E., Through NW quadrant of Ivanpah No. 1	See “NRHP Eligibility” subsection, below	Fergusson 2007
CA-SBR-12575H (2007)	Dirt road, faint two-track	Sec. 3, T. 16 N., R. 14 E, Through NW quadrant of Ivanpah No. 1.	See “NRHP Eligibility” subsection, below	Fergusson 2007
36-020713 (2009)	an adit of unknown age with low-lying tailing piles and a bladed loop road	Sec. 27, T16N., R14E., I-15 Alternative	See NHRP Eligibility subsection below	McDougall & Horne 2009
36-020714 (2009)	mining prospect of unknown age with low-lying tailing piles and a small, low rock cairn	Sec. 27, T16N., R14E., I-15 Alternative	See NHRP Eligibility subsection below	McDougall & Horne 2009

Cultural Resource Type (Year of Initial Recordation)	Description	Location	National Register of Historic Places (NRHP) Status	Siting Case Report Reference
36-020715 (2009)	a dismantled rock cairn (mining claim marker) 210 ft. from the adit noted above with no debris associated	Sec. 27, T16N., R14E., I-15 Alternative	See NHRP Eligibility subsection below	McDougall & Horne 2009
36-020716	segment of a dirt road that appears to correspond to the Road to Bullion Mine	Sec. 27, T16N., R14E., I-15 Alternative	See NHRP Eligibility subsection below	McDougall & Horne 2009
Archaeological Resources				
ISEGS-01 (2008)	Complex of dry-stacked masonry features that include apparent terraces, niches, a bench, and a rock platform	Sec. 34, T. 17 N, R. 14 E., E of Ivanpah No. 2	See "NRHP Eligibility" subsection, below	Helton, Lawson, and Spaulding 2008; Lawson, Helton, and Spaulding 2008
Ethnographic Resources				
None				

This subsection discusses the methods and the results of each field inventory phase and interprets the resultant inventory relative to the cultural resources distribution models above to assess how well the inventory represents the archaeology of the project area. Descriptions of each cultural resource in the inventory, evaluations of the eligibility of each resource for inclusion in the NRHP, assessments of project impacts on each known historical resource, consideration of and potential impacts on archaeological resources that may lie buried on the project site, and mitigation measures to avoid or reduce adverse impacts may be found in the "National Register of Historic Places Eligibility" and "Identification and Assessment of Direct Impacts on Built-Environment Resources and Proposed Mitigation" subsections below.

Geoarchaeology Study

BLM made a request to the applicant (Data Request No. 40) to provide information that would facilitate the assessment of the potential for the project to encounter buried archaeological deposits during the construction, operation, maintenance, closure, and decommissioning of the project. The response from the applicant was a geoarchaeology[20] study that, on the basis of background research, spatial analysis, and primary field research, provides a thorough discussion of the historical geomorphology

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[20] Geoarchaeology is a subdiscipline of archaeology that uses the techniques and approaches of earth sciences such as geology, geomorphology, sedimentology, pedology, and stratigraphy to identify, investigate, and interpret the history of the human use of present and former landscapes.

of the project area and an assessment of the likely presence of buried archaeological deposits there.

Methods

Data for the recent study of the geoarchaeology of the proposed project area (CH2M Hill 2008j, pp. 9–18) comes from the use of remote sensing techniques and field observation. The study began with an analysis of satellite imagery of the northern end of Ivanpah Dry Lake to try and discern aspects of the depositional history of the bajada that underlies the project area, as a whole. A high- resolution aerial photograph of the project area was then used to analyze the surface morphology of the bajada and to delimit, on the basis of visual albedo[21], the darker (older) surface areas of the bajada that would not have been subject to more recent erosion. The resultant surface areas were then scored separately for albedo and apparent surface roughness, both being age-dependent attributes. A sample of the remotely delimited surface areas (N = 28) and two younger surface areas were field-inspected to evaluate the accuracy of the remote analysis and to more closely observe the sample surfaces for prehistoric archaeological remains.

Results

The geoarchaeology study (CH2M Hill 2008j, pp. 9–18) concludes that the surface and subsurface prehistoric archaeological potential of the proposed project area, which is on the middle reaches of the Clark Mountain bajada, is negligible. The field inspection of a sample of 28 of the remnant patches of the older bajada surface did not result in the location of any archaeological remains. If buried prehistoric archaeological deposits were a component of the sedimentary matrix of the Clark Mountain bajada, then artifacts would be anticipated to be constituents of the surfaces of the remnant patches. They are not. The surfaces of the remnant patches are clad in what is referred to as desert pavements, accretionary deposits that form over a long period of time where a single layer of clasts is borne upward on a continually accreting layer of wind-blown or eolian silt. A subset of the artifacts that would be present on a hypothetical former surface of the bajada would become incorporated into a desert pavement that slowly developed over that former surface, leaving the balance of the artifacts on the former surface beneath the forming desert pavement. The absence of artifacts on or in the desert pavements of the remnant patches in the present investigation provides objective evidence that buried prehistoric archaeological deposits may be largely absent on the bajada. Further evidence that would appear to support this conclusion is that only three isolate prehistoric artifacts have been found as the result of the pedestrian surveys of the entire project area (see "Pedestrian Surveys" subsection, below). If buried prehistoric archaeological deposits were present in the project area, then, presumably, the artifacts and the sedimentary matrix from such deposits would be eroding out in places and open to observation on the surface of the bajada, what is now known to be an erosional landform. This does not occur.

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[21] The fraction of incident electromagnetic radiation reflected by a surface.

One ancillary application of the results of the geoarchaeology study is the observation that even portions of the surface of the bajada that are more recent in age than the above remnant patches may have been stable for a while. A subfossil piñon log (*Pinus monophylla*) was found on a more recent bajada surface among recently active ephemeral streams. The log is thought to be anywhere from 1,100–3,400 years old and may date the surface on which it was found to that approximate age. This information and the recent inadvertent discovery of an intact historical archaeological site (Temporary field no. ISEGS-02) approximately 1,700 feet to the east of Ivanpah No. 2 (see "Traditional Cultural Property Reconnaissance Surveys" subsection, below) demonstrates that, although the bajada is subject to a geomorphic regime of net erosion, the landform provides enough stable surface patches to preserve a representative sample of the historical archaeological deposits that would reflect historic activity on the bajada.

Intensive Pedestrian Surveys

Primary Intensive Pedestrian Cultural Resources Survey

The applicant undertook an intensive pedestrian cultural resources survey of the originally proposed project area. The purpose of the survey was to provide information on the location and the character of the cultural resources that may lie on the surface of the project area. The results contribute to the compilation of the cultural resources inventory of the proposed project area.

Methods

CH2M HILL conducted the survey of the project area from April 25 through May 22, 2007, adjusting the survey methods while the survey was in progress. The survey of the majority of Ivanpah No. 1 was done using transects that were 15 meters apart. On the CULTURAL RESOURCES 4.12-42 March 2009 basis of the field perception that the potential for encountering cultural resources was low due to disturbance from active, braided, ephemeral drainages, the BLM agreed to a request from CH2M HILL to widen the transect interval to 30 meters with the condition that survey areas that had desert pavements or rock outcrops with desert varnish would be examined more intensively. Ivanpah No. 2 and Ivanpah No. 3, and, apparently, the balance of the project area were surveyed under the latter protocol. When cultural resources were found during the survey, the field archaeologists would delimit the surface extent of each resource, plot the resource on a United States Geological Survey (USGS) 7.5-minute topographic quadrangle series map, and acquire global positioning system (GPS) data for the resource using a Trimble Geo XH mapping-grade unit. Additional field recordation efforts for archaeological sites were to photograph artifacts and site features, and to count and classify artifacts, where reasonable. No artifacts were collected during the survey. The archaeologists reported the ground visibility in the project area to have been approximately 90 percent, or excellent.

Results

CH2M HILL found two new cultural resources in the proposed project area (CA-SBR-12574H and CA-SBR-12575H) and six cultural resources isolates in primary depositional contexts. The isolate resources include a horseshoe, two mining prospects,

an obsidian flake, an obsidian nodule, and a chert biface. It is of note that the lithic artifacts are of stone types for which there are no sources in Ivanpah Valley or the mountain ranges that form its margins. Historic tin cans, most apparently dating to the late 1800s, were also found in the stream beds and on the banks of nearly every major ephemeral stream in the project area. These artifacts were not recorded as isolate resources, because they were interpreted, in the field, as being the result of secondary re-deposition from upstream mining-related sites in the Clark Mountain Range.

Supplemental Intensive Pedestrian Cultural Resources Survey

Subsequent to August 31, 2007, a number of the components of the project were altered, which resulted in the expansion of the project site. CH2M HILL, the consultant to the applicant, conducted additional intensive pedestrian survey on 371.45 acres to take into account portions of the expanded project site that had not been subject to prior survey.

Methods

Two CH2M HILL field archaeologists conducted the survey of 371.45 acres from April 29 through May 1, 2008, approximately six person- days, walking transects 15 meters apart. The archaeologists used USGS 7.5-minute topographic quadrangle series maps, aerial photographs, and Trimble hand-held GPS units to navigate to survey areas and to help record their observations. The visibility of the ground surface in the survey areas was reported to have been excellent, at approximately 90 percent.

Results

The archaeologists report the complete absence of prehistoric or historic cultural resources in the areas surveyed. They described the surface of the surveyed areas as exhibiting no evidence of modern development. Widespread evidence of bajada flooding events and sheetwash deposition was also noted.

Traditional Cultural Property Reconnaissance Surveys

May 23, 2008 Pedestrian Reconnaissance Survey of Project Area Inselbergs

BLM asked the applicant to provide information that would facilitate the assessment of the potential for the built project to affect Native American traditional use areas that may be in sight of the project area. The request sought discussions of both known ethnographic resources, and the potential for ethnographic resources that may not yet be known. To fulfill the request, the applicant would have had to more actively research extant ethnographic sources and expand the project area of analysis beyond the minimum requirements in the Energy Commission's siting regulations to include what were then unsurveyed lands surrounding the project site. The applicant's response to the data request was that the archaeological survey report already documented requests that the applicant had made of others for information on known Native American traditional use areas. The BLM conducted four transects across the originally proposed footprint and confirmed the paucity of cultural remains. Energy Commission archaeologists chose to conduct a pedestrian reconnaissance of a portion of the inselbergs in the vicinity of the project site to help develop a reasonable scope for a

more specific request to the applicant to conduct an ethnographic field survey for the present analysis. The purpose of the reconnaissance was to acquire a sense of how likely ethnographic resources were to be present on the inselbergs adjacent to the project area, and to acquire a sense of the topography of the Clark Mountain Range foothills, beyond the inselbergs, and the potential for the project to affect any ethnographic resources that may be present there.

Methods

On May 23, 2008, Energy Commission staff Michael McGuirt and Misa Milliron, Energy Commission consultant Susan Sanders, and BLM staff Colin Grant conducted a biological and cultural resources reconnaissance survey of the Paleozoic marine limestone inselberg just to the west of the Ivanpah No. 3 project area boundary. Later in the day, during a brief respite in a rolling series of thunderstorms, the same group, minus Colin Grant, conducted further reconnaissance of the southern portion of the Precambrian metamorphic inselberg complex just to the east of the Ivanpah No. 3 project area boundary.

The reconnaissance entailed a brisk walk-over of the two areas. The group first drove to the northern end of the limestone inselberg and hiked along its single crest to its southern terminus. The smaller group then later hiked out from near the intersection of the Hoover Dam- to- San Bernardino 115- kV Transmission Line (CA-SBR-10315H) and Colosseum Road approximately 0.7 miles to the low hill that is the most southerly extent of the metamorphic inselberg complex. The latter group hiked the crest of the low hill from south to north and then hiked up to the summit of the most southerly crest of the primary inselberg of the complex, before returning to Colosseum Road. Navigation for the reconnaissance was done using a computer-generated TOPO! topographic map and a hand-held Suunto compass. Field notes and digital images made with a Nikon CoolPix P3 camera variably record the observations made on the reconnaissance. Ground surface visibility on both the limestone inselberg and the metamorphic inselberg complex was excellent as they are bedrock formations. Visibility ranged from 90 to 100 percent.

Results

Energy Commission staff found two new archaeological sites as a result of the brief reconnaissance (Temporary field nos. ISEGS-01 and ISEGS-02), both located outside of the proposed project and alternative areas. Archaeological site ISEGS-02 was found on the way from Colosseum Road to the metamorphic inselberg complex, and, although it falls outside the project area of analysis, a brief description and interpretation of it is given here, because the presence of the site has a bearing on the potential frequency of historical archaeological sites across the middle reaches of the Clark Mountain bajada and on the differential stability of portions of the bajada surface. The discussion of archaeological site ISEGS-01 can be found below.

ISEGS-02 is a historic trash scatter or refuse deposit that appears to date roughly to the 1890s to 1910s. The site appears to be a discrete, primary deposit, measuring approximately 15–20 feet in diameter. It was found on a bajada surface slightly higher than the ephemeral stream channels nearby that flank it, on a bajada interfluve. The

frequency of the artifacts in the deposit is moderate, and the deposit artifact assemblage includes one whole, embossed, manganese-decolorized, beverage bottle, two whole, colorless, wide-mouthed pickle jars with "Heinz" embossments, and many apparent food and evaporated milk tins. The food tins are hole-in-cap cans with apparent lock or folded-edge side seams, flush, stamped can ends, roughly 1–1½-inch-diameter, hand-soldered caps, and hand-soldered cap vents. The evaporated milk tins have flush, stamped can ends and hand-soldered, matchstick filler closures. The deposit, as a whole, appears to represent a single episode or cycle of activity, as multiple points of discard were not apparent. Given the distance of the deposit from any known or apparent roads or trails, or from any known or apparent loci of habitation, and given the apparent age of the deposit, it most likely represents the locus of a temporary campsite.

September, 2008 Helicopter and Pedestrian Reconnaissance Survey

BLM reinitiated discussions with the applicant at the June 23, 2008 Data Response and Issues Resolution Workshop in Primm, Nevada, and at the July 2, 2008 continuance of that workshop in Sacramento. BLM sought to encourage the applicant to provide information on the potential presence of Native American traditional use areas beyond the project site that would be subject to the direct impact of the stark visual intrusion that the project would impose on any such resources. To demonstrate the potential presence of Native American traditional use areas in sight of the proposed project, BLM shared the preliminary results of the May 23, 2008 pedestrian reconnaissance survey of the inselbergs adjacent to the project area as evidence that such use areas may be present. BLM asked at the June 23 workshop that the applicant more formally evaluate the archaeological site that was found as a result of that reconnaissance (ISEGS-01) and that the applicant conduct a pedestrian reconnaissance of the inselbergs adjacent to the project site and along the ridgelines of the toe of approximately eleven of the Clark Mountain Range foothills that overlook the project site. The applicant agreed to the requests at the July 2 continuance of the workshop and asked, in turn, that BLM staff provide protocols for both the evaluation of ISEGS-01 and the reconnaissance survey. BLM staff developed them, incorporating a subsequent request by the applicant to integrate the use of a helicopter in the reconnaissance survey. The BLM gave the applicant the "Protocol for Reconnaissance Survey for Native American Traditional Use Areas" and the "Protocol for the Documentation and Evaluation of Archaeological Site ISEGS-01" on or about July 21, 2008 (CEC 2008c). The applicant produced a preliminary summary of the results of the field efforts for the protocols in a confidential technical memorandum of September 17, 2008 (Helton, Lawson, and Spaulding 2008), which references a forthcoming, more detailed letter report. The latter report (Lawson, Helton, and Spaulding 2008), a second confidential technical memorandum of December 5, 2008, provides the final results of both the reconnaissance survey and the evaluation of ISEGS-01 (see "Evaluation of Archaeological Site ISEGS-01" subsection, below).

Methods

The consultant to the applicant, CH2M HILL, implemented the "Protocol for Reconnaissance Survey for Native American Traditional Use Areas" (Reconnaissance

Survey Protocol), making modest adjustments to the "Field Investigation Methods" in the protocol. The purpose of the reconnaissance was to facilitate the rapid field documentation of potential Native American traditional use areas in the portion of the project area of analysis where the proposed project would create direct visual impacts for such resources. The primary focus of the reconnaissance was the identification of archaeological sites, and natural landscape loci where cultural modification is apparent, that may be prehistoric or historic Native American traditional use areas. Archaeological sites and modified landscape loci that are not demonstrably of Native American origin and cannot reasonably be attributed to some manner of ongoing traditional use fall outside of the project area of analysis and further consideration in the present analysis, because direct visual impacts to those resources would not compromise their historic integrity.

The original Reconnaissance Survey Protocol requests that the applicant conduct a helicopter reconnaissance of the crest of each ridgeline in circled areas on a hardcopy map that Energy Commission and BLM staff gave to the applicant at the June 23 workshop. The cited map delimits a total of 12 circular reconnaissance survey areas (Areas 1–10, Limestone Ridge, and Metamorphic Hill, Cultural Resources Figure 1) in an arc from southwest of the project site clockwise to north of the project site, across the toe of the Clark Mountain Range foothills. The protocol requests that the applicant maintain a helicopter skid-to-ground height of approximately 25 feet while conducting the reconnaissance and assess the viability of the use of a helicopter for the reconnaissance of Native American traditional use areas by conducting an initial flyover of ISEGS-01. If ISEGS-01 was not clearly visible from a 25-foot height, then the applicant was to abandon the use of the helicopter and conduct the survey of the ridgelines in the reconnaissance survey areas on foot. If ISEGS-01 was clearly visible from 25 feet, then the applicant was to use the helicopter to survey the subject ridgelines and follow up the helicopter survey with pedestrian surveys of sample areas on several of the ridgelines in the reconnaissance survey areas to verify the accuracy of the results of the helicopter survey. The applicant chose instead to conduct pedestrian surveys of the Limestone Ridge, the Paleozoic marine limestone inselberg just to the west of the Ivanpah No. 3 project site boundary, and the Metamorphic Hill, the Precambrian metamorphic inselberg complex just to the east of the Ivanpah No. 3 project site boundary, and to conduct a helicopter reconnaissance of a sample of the ridgelines in Areas 1–10. In late August, 2008, the applicant, citing the length and the steep grade of many of the ridgelines in Areas 1–10, submitted revised maps of those survey areas that delimited 22 reconnaissance targets. The reconnaissance targets are a sample of the flatter ridges and of the topographic highs within each survey area that possess unobstructed views of the surrounding terrain (Cultural Resources Figure 1). The applicant requested that BLM staff agree to restrict the helicopter survey to the 22 reconnaissance targets. BLM staff agreed to this revision to the original Reconnaissance Survey Protocol. Subsequent to BLM staff approval of the revision to the protocol, the applicant added a further reconnaissance survey area, Area 11, to the north-northeast of the project site and five new reconnaissance targets, for a total of 27 reconnaissance targets.

The Reconnaissance Survey Protocol also includes methods for the recordation of archaeological deposits found as a result of the survey, "Field Recordation of

Archaeological Remains." The applicant was to complete California Department of Parks and Recreation (DPR) 523A and 523J forms for each archaeological site, and each locus of cultural modification to the natural landscape, found that *may* be a prehistoric or historic Native American traditional use area, record field notes that document descriptions of and GPS coordinates for archaeological sites and loci of natural landscape modification that the applicant does *not* believe are Native American traditional use areas, and record field notes that document descriptions of isolate artifacts and diffuse artifact scatters that collectively make up the low frequency background of the local archaeological record. The purpose of the documentation of archaeological remains and modified landscape loci that are not thought to be of Native American origin is to document the authenticity and accuracy of the results of the reconnaissance, and to provide an empirical archaeological context for the interpretation of the results, whether positive *or* negative.

CH2M HILL archaeologists conducted the pedestrian reconnaissance survey of the Limestone Ridge and the Metamorphic Hill, intermittently, from September 2 through 4, 2008. The archaeologists conducted meandering pedestrian surveys of the crest of the ridge and the topographic highs of the metamorphic rock outcrops that compose the Metamorphic Hill, or the Precambrian metamorphic inselberg complex. Photographs and GPS coordinates were taken of and for archaeological sites and loci of landscape modification that the archaeologists understood as unlikely to be Native American in origin, and of and for other archaeological sites and loci of indeterminate cultural affinity. Field notes on artifacts found in association with such sites or loci were taken. The other field recordation methods of the Reconnaissance Survey Protocol also appear to have been followed.

CH2M HILL archaeologists conducted the helicopter portion of the reconnaissance survey on September 8 and 9, 2008. Each of the 27 reconnaissance targets were subject to close aerial survey and videotaping at heights of approximately 50 to 300 feet above the ground, in apparent deviation from the Reconnaissance Survey Protocol. Navigation to each reconnaissance target was accomplished through the use of the GPS navigation computer in the helicopter, reference to hardcopy USGS 7.5-minute topographic quadrangle series maps, and hand-held GPS units. Where safe landing zones for the helicopter were found in Areas 1–7, and 11 (There were 14 such zones, or N =14), the archaeologists conducted meandering pedestrian surveys of the crest of target ridgelines and of the topographic highs. Photographs and GPS coordinates were taken along each surveyed ridge crest. The other field recordation methods of the Reconnaissance Survey Protocol also appear to have been followed.

Results

The helicopter and pedestrian reconnaissance survey did not result in the discovery of archaeological features or deposits that CH2M HILL archaeologists understood to be Native American traditional use areas. The reported results of the survey are presented here to document their authenticity and accuracy, and to better enable the interpretation of the archaeological record of the project area by articulating its broader archaeological context. As the vast majority of the archaeological features and deposits found unambiguously represent historic mining or prospecting activity and the balance of the features and deposits do not appear to comport in character to known prehistoric or

historic Native American traditional use areas, they receive no further consideration in the present analysis.

Limestone Ridge

The result of the pedestrian survey of the Limestone Ridge, outside of the proposed project and alternative areas, was the discovery of an unreported number of historic mining and related features, and, apparently, three rock shelters. The historic mining and related features include an unreported number of mine adits and prospect pits, a concrete staircase, and a large can dump. The can dump consists primarily of sanitary cans, and includes, as lesser constituents, screw-top colorless glass jars, pull-tab beer and juice cans, and at least one evaporated milk tin with a matchstick filler closure.

The three rock shelters on the Limestone Ridge were, with one exception, devoid of artifacts and therefore difficult to ascribe to a particular culture. One rock shelter on the western side of the ridge is of unreported dimensions and has what appears to be dry-stacked rock walls of unreported dimensions associated with it. No artifacts were found in association with the shelter.

Another rock shelter of unreported location on the ridge has an entrance that is 75 centimeters high and 80 centimeters wide, and recedes two meters back into the ridge. The ceiling of the shelter apparently has small holes of unreported dimensions that open out to the sky. There appear to be dry-stacked rocks on either side of the entrance, one of which may be a short wall. Three stacked rocks flank the eastern side of the shelter entrance, and 15, approximately 20-by-20-centimeter, stacked cobbles form a wall on the western side of the entrance. Approximately 20 smaller cobbles act as filler stones, or chinks in the voids between the larger stones in the wall. Both the wall and the three stacked rocks are reported to have further smaller gravel chinks. The condition of the wall and the three stacked rocks is reported to be good. No artifacts were found in association with this shelter.

The third rock shelter appears to be near the crest of the ridge and opens up onto the western and eastern sides of it. A slightly polished, apparent artifact, or manuports, was found inside the shelter. The manuport is reported to be a large igneous rock with one very flat surface that apparently has small, polished protrusions on it that do not exceed one centimeter in height. The protrusions are reported not to evidence grinding, and other protrusions and protruding ridges on the subject surface are reported to not be flat. The archaeologists for the applicant interpret the manuport as likely indicative of the prehistoric use of the shelter.

Metamorphic Hill

The result of the pedestrian survey of the Metamorphic Hill was the apparent discovery of numerous prospect pits, a number of rock cairns, large areas of mechanical disturbance, a rock wall, an abandoned truck, and a geocache. The Metamorphic Hill, or the Precambrian metamorphic inselberg complex just to the east of the Ivanpah No. 3 project site boundary is made up of a smaller western inselberg, a much larger eastern inselberg, and a tiny southern knoll where ISEGS-01 is found. Three prospect pit and rock cairn complexes were found on the western and eastern inselbergs, two on the former and one on the eastern side of the latter. Each complex appears to include a

single prospect pit and a single rock cairn, probably the discovery monument that marks the location of the mineral vein or lode originally exposed in each adjacent prospect pit.

A rock wall and rock cairn complex was found on the southwestern side of the eastern inselberg just above an ephemeral stream on the surface of the adjacent bajada. A portion of the east-to-west-trending rock wall and the whole cairn have fallen apart. The intact portion of the rock wall, approximately three-quarters of its eastern extent, measures approximately 3.0 meters in length and 1.5 meters in height. The wall is founded on a local outcrop of metamorphic bedrock and is itself of unreported rock type. The base of the wall is of boulders that are approximately 20 by 30 centimeters in dimension, and the size of the rock gradually decreases toward the top of the wall, the last course of which includes cobbles that are approximately 10 by 20 centimeters in dimension. An unreported number of prospect pits and an unreported type of abandoned truck were found near the wall and cairn complex. No artifacts were found in or near the broader complex.

A partially intact, solitary rock cairn was found downslope, apparently on the southern side of the western inselberg. The cairn is made up of approximately 12 large cobbles of the local metamorphic rock that encircle a large, white quartzite cobble. Additional large metamorphic cobbles and a further quartzite cobble abut the base of the cairn.

Areas 1–11

The result of the helicopter survey of Areas 1–11 appears to be the discovery of a minimum of 16 cairns, apparently of rock, a mine shaft, a mine adit, a prospect pit, and two historic trash scatters. The applicant does not clearly report the total number of archaeological features, artifact concentrations, or isolate artifacts found. This minimum inventory of archaeological remains is differentially distributed among the foothills to the southwest and west of the project site (Areas 1–6) and those to the north of it (Areas 7–11).

<u>Areas 1–6</u>

The arc of reconnaissance survey areas to the southwest and west of the project site, Areas 1–6, were found to have 12 of the 16 cairns, apparently of rock, the mine shaft, the mine adit, the prospect pit, and both historic trash scatters. The applicant does not clearly report the associations among these features and artifact concentrations, but a number of relatively secure associations can be made. Six of the 12 cairns appear to bear some association with the mine shaft (N = 2), the mine adit (N = 3), and the prospect pit (N = 1). These cairns most likely were discovery monuments or boundary markers for historic lode claims. Two of the above six cairns, one that may be associated with the mine shaft and another that may be associated with the prospect pit, are reported to have been found in association with historic trash scatters, or refuse deposits. The historic refuse deposit near the mine shaft is reported to include two Prince Albert tobacco tins, and a historic beer can. The refuse deposit near the prospect pit, which the applicant appears to report as having been mechanically excavated, is reported to include one horse or burro shoe, one meat tin, and a fragmentary brown glass bottle body with two mold seams.

Four of the 12 cairns found in Areas 1–6 were found in a close group in a small saddle along a ridgeline. Each of these cairns is reported to be small and to include a few rocks of unreported type. No other archaeological features or artifacts were found in association with this cairn group.

One of the final two cairns, both of which were found as isolate archaeological features, is reported to include a wooden lathe of unreported dimensions.

Areas 7–11

The arc of reconnaissance survey areas to the north of the project site, Areas 7–11, were found to have four of the 16 cairns found as a result of the helicopter survey. The four cairns appear to have each been found as isolate archaeological features. One is reported to include a wooden lathe of unreported dimensions.

Ivanpah I-15 Alternative Reconnaissance and Windshield Survey

In August 2009, a vehicular 'windshield' survey was conducted by two teams (2 people each) slowly driving two separate vehicles on all dirt access roads shown on the existing USGS topographic quadrangles within the Ivanpah I-15 Alternative, visually inspecting an estimated 20 meter wide corridor on either side of the roads. In addition, a 0.75 mile square Sample block located within the southwestern corner of the Alternative was conducted using two archaeologist surveying 15 meter parallel transects. The surveyors also revisited all previously recorded sites within this alternative.

Results

Three previously recorded sites were relocated and four historic period sites were identified:

- CA-SBr-7689/H: Segment of Arrowhead Highway, previously determined not eligible
- CA-SBr-10803H: Remains of Stateline well and corral/stock loading facility. This was previously recorded and determined not eligible
- CA-SBr-10806H: Segment of the Ivanpah-Providence Road. Previously recorded however AE identified an additional segment. The original site was determined not eligible
- 36-020713: an adit of unknown age with low-lying tailing piles and a bladed loop road, no refuse that might have suggested age were identified
- 36-020714: mining prospect of unknown age with low-lying tailing piles and a small, low rock cairn (probably a mining claim marker)
- 36-020715: a dismantled rock cairn (mining claim marker) 210 ft. from the adit noted above with no debris associated
- 36-020716: segment of a dirt road that appears to correspond to the 'Road to Bullion Mine' on the 1885 GLO map. They recorded just under one mile of this route. No debris was identified adjacent to the road.

Interpretation of Results

The total cultural resources inventory for the project area of analysis includes four previously known and six new historic period resources, and one new prehistoric resource (see **Table 4.4-7** above). The comparison and interpretation of the results of the efforts to develop the project inventory are made here, relative to the cultural resources distribution models above, to assess the reliability of the results.

Model of Prehistoric Archaeological Resources

Comparison

The results of the efforts to identify prehistoric archaeological resources in the project area of analysis conform well to the predictions of the above model for this resource class. The composite pedestrian survey of 100 percent of the previous project area resulted in the identification of only three isolate prehistoric artifacts, one obsidian flake, one obsidian nodule, and one complete chert biface. Subsequent reconnaissance surveys around the project area and those conducted for the Ivanpah I-15 Alternative did not identify prehistoric resources.

Interpretation

The extremely low frequency of unambiguous prehistoric material culture across the project area of analysis confirms the above anticipatory model for the area and appears to indicate almost no use of this portion of the Clark Mountain bajada throughout prehistory. The dearth of prehistoric artifacts in the area suggests that this portion of the bajada has been nothing more than a transit zone between the floor of Ivanpah Valley and the Clark Mountain Range. The use of this portion of the bajada for any kind of resource collection or processing over the millennia would have undoubtedly left at least a low-frequency material trace. There is virtually none. The material trace of human activity in the area is so faint that the use of the project area as a transit zone must have been light as well. One would anticipate a higher frequency of artifacts resulting even from incidental discard had the use of the area been greater. A useful focus of future inquiry would be to investigate whether analogous environmental contexts in the region evidence a similarly light mode of human use.

Interpretation of Ethnographic Resources

No cultural resources were found in the project area of analysis that can be thought, on the basis of archaeological evidence, to unambiguously represent ethnographic resources. One or more of the three rock shelters that were found on the Limestone Ridge, the Paleozoic marine limestone inselberg just to the west of the Ivanpah No. 3 project site boundary, one or more of the isolate cairns or the cairn group found across the toe of the Clark Mountain Range foothills, and archaeological site ISEGS-01 may be Native American in origin or use, but none of them clearly evidence any manner of ongoing traditional use. The resources may or may not have the potential to yield information important to Native American prehistory or history, but, in the absence of attributes that unambiguously indicate continuity of use into the present or use modes that are not mundane, there is no archaeological evidence to assert the association of

the resources with traditional Native American practices. Native American consultation to date contributes no further insight into the character of these resources.

Model of Historical Archaeological and Built-environment Resources

Comparison

The historical archaeological and built-environment resources found in the project area include a variety of the resource types that the above model anticipates, but the frequency of the resources is a bit lower than the model predicts. The built-environment resources include one operational (CA-SBR-10315H) and one abandoned (CA-SBR-12574H) utility corridor, and a roughly east-to-west-trending segment of a dirt road (CA-SBR-12575H, CA-SBr-10806H, and 36-020716), a north-south trending previous 'highway' (CA-SBr-7689H and several historic/modern mining features (36-020713, 36-020714 and 36-020715). The frequency of primary deposits of historical archaeological resources in the project area is particularly low and includes only three isolate resources, a horseshoe and two mining prospects.

Interpretation

The inventory of built-environment resources comports relatively well with the anticipatory model for historical archaeological and built-environment resources. The extremely low frequency of primary deposits of historical archaeological resources in the project area is a phenomenon of interest. Given the presumed relatively high volume of foot, horse, wagon, and, most recently, automobile traffic that would have passed through the project area coming up off of the valley floor and heading toward the mines in the Clark Mountain Range, principally from the 1860s through the 1910s, one would anticipate a higher frequency of intact deposits of historical archaeological materials. One would anticipate finding debris along the travel corridors in proportion to the volume of the traffic that passed though the area, and one would further anticipate finding refuse deposits related to temporary camps, such as ISEGS-02, that would have been used during travel to and to stage departures into the Clark Mountain Range, and to support mine prospecting efforts closer to the project area, on the limestone inselberg and in the metamorphic inselberg complex. The low frequency of primary deposits of historical archaeological materials may, therefore, indicate a lower volume of transit through the project area than had been presumed and further indicate that transit was typically without stops.

Reliability of Cultural Resources Inventory

BLM finds, on the basis of the above analysis, that the cultural resources inventory for the project area of analysis is a reliable body of information on which to base its decision on the potential for the construction, operation, maintenance, closure, and decommissioning of the proposed project to have an adverse effect on cultural resources.

National Register of Historic Places and California Register of Historical Resources Eligibility

The cultural resources inventory for the project area of analysis presently includes three built-environment resources and one archaeological resource (**Table 4.4-7**). One of the built-environment resources, the Hoover Dam-to-San Bernardino transmission line (CA-SBR-10315H), has already been determined eligible, by consensus, for inclusion in the NRHP and is listed on the California Register of Historical Resources (CRHR) as a consequence of that determination. The CRHR eligibility of the other three resources, CA-SBR-12574H, CA-SBR-12575H, and ISEGS-01, is formally being considered here for the first time.

Investigation to Evaluate Archaeological Site ISEGS-01

Archaeological site ISEGS-01 was found as a result of the May 23, 2008 pedestrian reconnaissance survey of the inselbergs in the project area of analysis (see "Traditional Cultural Property Reconnaissance Surveys" subsection, above). BLM asked at the June 23, 2008 Data Response and Issues Resolution Workshop in Primm, Nevada, that the applicant more formally evaluate ISEGS-01. The applicant agreed to that request at the July 2, 2008 continuance of the workshop in Sacramento, and asked, in turn, that CEC and BLM staff provide a protocol for the evaluation. CEC and BLM staff jointly developed that protocol, and the BLM gave the applicant the "Protocol for the Documentation and Evaluation of Archaeological Site ISEGS-01" (ISEGS-01 Evaluation Protocol) on or about July 21, 2008 (CEC 2008c). The applicant produced a preliminary summary of the results of the field efforts for both the ISEGS-01 Evaluation Protocol and the Reconnaissance Survey Protocol in a confidential technical memorandum of September 17, 2008 (Helton, Lawson, and Spaulding 2008), which references a forthcoming, more detailed letter report. The latter report (Lawson, Helton, and Spaulding 2008), a second confidential technical memorandum of December 5, 2008, provides the final results of both protocols (see "September, 2008 Helicopter and Pedestrian Reconnaissance Survey" subsection, above, for the results of the Reconnaissance Survey Protocol).

Methods

The consultant to the applicant, CH2M HILL, implemented the ISEGS-01 Evaluation Protocol, substantively augmenting the "Background Literature Review" in the protocol. The purpose of the protocol was to more formally assess and evaluate the origin and the historical significance of ISEGS-01 in an attempt to acquire the minimum amount of data necessary to determine whether the subject site is a Native American traditional use area eligible for inclusion in either the CRHR or the NRHP, and, if so, whether the degradation of the integrity of the site from the construction and operation of the proposed project would be either a substantial adverse change in the significance of a historical resource under CEQA or an adverse effect under the National Historic Preservation Act. CEC and BLM staff states in the protocol that the CEC and the BLM would consider the results of the work done under this protocol sufficient to conclude the *archaeological* effort to determine whether ISEGS-01 is a Native American traditional use area.

The ISEGS-01 Evaluation Protocol requests that the applicant conduct a program of background research and field investigation. The background research portion of the program, as originally proposed, has two parts. One part is a review of the extant ethnographic literature on the Southern Paiute, the Chemehuevi, and the Mojave to discern whether site types comparable to ISEGS-01 are known for any of these groups. The Southern Paiute, the Chemehuevi, and the Mojave each identify a relationship between the project area of analysis and the ancestral territories of their respective groups. The applicant chose to refine the ethnographic literature review to look at the archaeology and the known ethnographic construction and use of rock art, and rock feature sites such as rock alignments, rock rings, and rock cairns, and to look at known construction methods of ethnographic architecture and features. The second part of the background research in the protocol requests that the applicant contact cultural resource managers, cultural resource management consultants, and archaeological scholars of the Great Basin and of the Southwest to inquire whether ISEGS-01 represents a familiar site type and to solicit professional opinions as to its origin and use. The applicant ultimately chose to augment the background research with additional archival research into the archaeological site types that have been found in mountain ranges near the project area, and into early and more recent historic accounts of exploration, travel, and economic activity in and around the project area of analysis, the purpose of both efforts being to try and locate cultural resources similar to ISEGS-01 to facilitate its interpretation. The applicant conducted the background research under the protocol during September and October, 2008. The sources that the applicant used for the research include the following paper and electronic-format media, repositories, and individuals:

- Russell Crowe's 1903 Miner's Map of Death Valley and the Proposed Salt Lake Railroads, SBAIC
- J. Harold Barnun's 1911 Map of San Bernardino County,].S. Bright Surveyor, SBAIC
- 1917 Part of the Mohave Region Relief Map, SBAIC
- 1932 Blackburn's Map of San Bernardino County, SBAIC
- 1955 Roach Lake 15' USGS quadrangle topographic map, University of Alabama, Historical Maps, electronic resource, http://alabamamaps.ua.edu/index.html
- 1968 State of California Map, Southern Half, University of Alabama, Historical Maps, electronic resource, http://alabamamaps.ua.edu/index.html
- Dennis G. Casebier's 1987 Guide to the Mojave Trail, SBAIC
- Brigadier General, A.A. Humphreys, Chief of Engineers, 1872, Preliminary Report Concerning Explorations and Survey, Principally in Nevada and Arizona, Washington D.C., Government Printing Office
- George Montague Wheeler, 1876, Annual Report on Geological Exploration and Surveys West of the 100th Meridian, Washington D.C., Government Printing Office

- Clarence King, 1877, Report of the Geological Exploration of the 40th Parallel-Made by Order, Washington D.C., Government Printing Office
- George M. Wheeler, First Lieutenant, Army Corps of Engineers, 1879, Report upon United States Geographical Surveys West of the One Hundredth Meridian, Volume VII-Archaeology, Washington D.C., Government Printing Office
- George M. Wheeler, Army Corps of Engineers, 1901, Preliminary Report Concerning Explorations and Surveys Principally in Nevada, Washington, D.C., Government Printing Office
- Samuel S. Gannett, 1903, Department of the Interior (DOI) United States Geographical Survey (USGS), Results of the Primary Triangulation and Primary Traverse, Fiscal Year 1902–1903, Washington D.C., Government Printing Office
- State of California Mine and Mining Claims database, SBAIC
- WorldCat, http://www.worldcat.org/
- JSTOR, www.jstor.org/
- Anthropology Plus, http://www.oclc.org/support/documentation/firstsearch/databases/dbdetails/details/AnthropologyPlus.htm
- ArticleFirst, http://www.oclc.org/support/documentation/FirstSearch/databases/dbdetails/details/ArticleFirst.htm
- AntroSource, http://www.aaanet.org/publications/anthrosource/
- Science Direct, http://www.sciencedirect.com/
- University of California-Irvine Library
- California State University-Long Beach Library
- Orange County Public Library
- Orange Library
- California State University-Fullerton, Pollack Library
- Newport Beach Public Library, Newport Beach
- Los Angeles Public Library Photo Collection, Los Angeles Public Library
- Dianne Winslow, Director, Harry Reid Center for Environmental Studies, Las Vegas
- Jeffrey R. Wedding, Archaeologist, Harry Reid Center for Environmental Studies, Las Vegas
- Robert R. Reynolds, Paleontologist, LSA Associates, Inc., Irvine
- Roderick McLean, Archaeologist, LSA Associates, Inc., Irvine
- James Cleland, Archaeologist, EDAW, San Diego

- Robin Laska, Acting Coordinator, CHRIS San Bernardino Archaeological Information Center, Redlands
- Albert Knight, Archaeologist, Southern California rock art consultant
- Dr. M.C Hall, Coordinator, CHRIS Eastern Information Center, Riverside
- Carrie Simmons, BLM, El Centro Field Office, El Centro
- James Shearer, BLM, Barstow Field Office, Barstow
- Wanda Raschkow, BLM, Palm Springs Field Office, Palm Springs
- Eric Ritter, BLM, Redding Field Office, Redding
- Susanne Rowe, BLM, Las Vegas Field Office, Las Vegas
- John Murray, BLM, California Desert District, Moreno Valley

The "Field and Laboratory Investigations" portion of the ISEGS-01 Evaluation Protocol requests that the applicant conduct a phased investigation of the site. The phases of the investigation were to include

1. a close field examination of the site and the site vicinity, including visual inspection for artifacts, cultural manuports, and ecofacts,
2. appropriate geophysical inspections of site features and the site vicinity to ascertain the presence of ferrous metal objects or other subsurface anomalies,
3. an examination of the rock features on the site to ascertain the material composition of the features, feature construction methods apparent in the placement patterns of individual feature rocks, and the apparent relative age of the features as may be discerned by the differential development of patination and varnish, or of organism growth on feature rocks, and,
4. if the results of the above examinations and inspections proved to be inconclusive, test excavations of individual archaeological features on the site to ascertain the presence or absence of cultural residues.

The protocol also lays out a specific suite of excavation and sampling techniques that were to be used in the event that test excavation was determined to be warranted.

The archaeologists for the applicant implemented the field investigation portion of the protocol at ISEGS-01 on September 2 and 4, 2008. The close field inspection of the site and the site vicinity was apparently a tight visual scour of those areas and included the use of reflected sunlight to examine a group of constructed rock niches on the site. The geophysical inspection of the site was conducted with a Fisher Model M-96 metal detector. The entire site and all of the site features were swept with the detector, as was the level ground around the site. The applicant chose to make relative age determinations the focus of the examination of the rock features on the site. The examination took into account three different potential indices of the relative age of the site—the origin and apparent age of the quartzite rock that composes part of one terrace pavement, the degree of weathering of the constituent rocks in the rock features of the site, and the development of desert pavements on site rock terraces. To execute

the examination of the features, close observations and notes were made of the color, shape, orientation, and relative distribution of the rocks that make up the features and of the rocks that form pavements on the site terraces.

Results

The results of the implementation of the ISEGS-01 Evaluation Protocol are, unfortunately, inconclusive. The background research on and the field investigation of the site are unable to reliably associate it with any particular time period, or any particular archaeological, ethnographic, or historic culture. The origin of the site, the character of its use, and its age, from an *archaeological* perspective, are enigmatic.

Background Research and an Interpretative Context for ISEGS-01

The background research for ISEGS-01, though relatively comprehensive, was largely unproductive. Additional archival research into the archaeological site types that have been found in mountain ranges near the project area and into early and more recent historic accounts of exploration, travel, and economic activity in and around the project area of analysis did not reveal or suggest any cultural resources that closely resemble ISEGS-01. Examinations of records for prehistoric and historic archaeological sites in the Spring and Lucy Gray mountain ranges and the State Line Hills in Nevada, and the Clark, Ivanpah, and Mescal mountain ranges in California, in a 15 to 20-mile radius around the project area found a total of 14 archaeological sites with constructed rock features. Seven of the 14 sites are unambiguously historic, one is unambiguously prehistoric, and the age of the other six is indeterminate. The historical archaeological sites include two mining sites with adits, a shaft, prospect pits, tailings, rock cairns, and historic refuse, two apparent ruins of dry-stacked masonry structures, two sites with a circular rock feature, two rock alignments of different forms and historic refuse, and one rock cairn with historic refuse. The prehistoric site has two rock alignments, a circular rock feature, a cleared area, a small dugout, a rock pile, and chipped and ground stone tools. The archaeological sites of indeterminate age include four sites with a circular rock feature, two rock alignments, a rock-lined dirt mound, and a small concentration of basalt cobbles, one apparent ruin of a dry-stacked masonry structure, and a "C"-shaped dry-stacked rock feature measuring 75 to 125 centimeters in height with a small (~1 m) square vestibule adjacent to it.

The review of both early and more recent historic accounts of exploration, travel, and economic activity in and around the project area of analysis reaffirms the broader outlines of the historic context of the project area, but does not provide more focused insight into the possible origin, function, or age of ISEGS-01.

Consultation with public sector cultural resource managers, cultural resource management consultants, and archaeological scholars also did not help interpret ISEGS-01. A number of those consulted thought that the absence of obvious eolian deposits on the site and the apparent lack of embeddedness[22] in the archaeological

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[22] Embeddedness describes the degree to which fine sediments surround coarse substrates on the surface of the landscape. A well-embedded archaeological feature is one where the voids or the interstices between the rocks that compose a feature are completely filled with fine sediment, and the

features of the site indicate a more recent timeframe for the construction of the site. Professional opinion on the character of the site spans a diverse range. Some see a connection to Native American shamanism in the panoramic view that the site commands and in the relatively abundant presence of quartzite on the site. Others thought that the site features may be related to historic land surveying efforts in the region. A further opinion is that the site features may be the result of recent or historic boredom. The thought is that historic or recent miners, prospectors, or those accompanying them, or military personnel on training missions may have constructed the features for lack of anything else to do.

Neither the review of the archaeological and ethnographic literature relating to rock art and rock feature sites nor the review of Southern Paiute, Chemehuevi, or Mojave architecture and construction methods found any information that could reliably be used to interpret the individual features of ISEGS-01 or the site as a whole.

Field Investigation of ISEGS-01

Given that the background research did not yield information substantive to the interpretation of ISEGS-01, the field investigation of the site offers the only objective source of data to develop our understanding of it.

The initial step in the field investigation of ISEGS-01 was the close field inspection of the site. The site was found to include five dry-stacked rock features and feature complexes (Features A–E) (Cultural Resources Figure 2 and Plate 2) arranged on either side of the crest of the tiny inselberg directly south of the larger eastern portion of the Precambrian metamorphic inselberg complex, which is east of the Ivanpah No. 3 project site boundary. The feature complexes include an eastern and western set of rock-faced terraces. The eastern terrace complex (Feature B) abuts a bedrock outcrop along the crest of its host inselberg and includes what appear to be a constructed rock bench and three constructed stone niches. There is a rock upright incorporated into the face of one of the terraces in the complex, and part of the surface of the fill of the terrace immediately beneath the upright is a jumbled pavement of angular quartzite cobbles. There are differences in the observations of the applicant and of Energy Commission staff as to the precise number and configuration of the site features, but the western terrace complex (Feature D) appears to include two or three terraces, while the eastern terrace complex appears to include four terraces. There are three additional rock features on the site. To the north-northeast of the eastern terrace complex, there is a stand-alone, triangular rock-faced feature (Feature A) with a fill of angular cobbles of the local metamorphic rock. To the east-southeast of the eastern terrace complex, there is what the applicant refers to as the “three-tiered rock feature” (Feature E). The feature appears to be a contiguous series of four, small, roughly square, rock-faced terraces. To the south-southeast of the eastern terrace complex, there is what the applicant refers to as the “dry-stacked rock wall” (Feature C). The feature is relatively short in length and presently measures approximately 50 to 60 centimeters in height. The applicant notes that a portion of the wall appears to have collapsed.

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character of the articulation of the feature with the surface of the landscape is similarly masked by fine sediment.

The field inspection of ISEGS-01, its constituent rock features, and the near-vicinity found no artifacts that could be unambiguously associated with the construction or use of the site. No portable material culture objects of any type were found in or among the site features. A sparse scatter of historic artifacts was found in a range of five to 15 meters from the site. Those artifacts include a fragmentary "7-Up" soda bottle that the archaeologists for the applicant date to the 1970s, colorless glass fragments that the archaeologists for the applicant interpret as beverage bottle fragments, and a recent shotgun shell casing.

The geophysical prospection of ISEGS-01 with the Fisher Model M-96 metal detector produced no signals that would indicate the potential presence of metallic debris.

The examination of the rock features of ISEGS-01 for potential indices of the relative age of the site concludes that the probable time of its construction ranges somewhere from the very late or terminal prehistoric period to the early historic period. The examination took into account three different potential indices of the relative age of the site—the origin and apparent age of the quartzite rock that composes part of one terrace pavement, the degree of weathering of the constituent rocks in the rock features of the site, and the development of desert pavements behind site rock terraces. The archaeologists for the applicant found that the origin of the quartzite rock that makes up the jumbled pavement of angular cobbles on one of the terraces of Feature B is a wide ($\leq$ 3 m) vein of quartzite approximately 30 meters to the northeast of the site. The vein has apparently been subject to mechanical prospection with heavy equipment. A comparison of the degree of weathering of the quartzite in the pavement versus the quartzite in and around the vein, in particular, the degree of discoloration and the shape of the rock, demonstrates that the quartzite that makes up the pavement was extracted from the vein prior to its mechanical prospection. There is a much higher incidence (30%) of the quartzite in the pavement being discolored from long-term weathering, of becoming reddened over time, than there is in the quartzite from the vein (4%). As the discoloration of the quartzite occurs primarily 5–10 centimeters below the surface of the vein, much of the quartzite for the pavement appears to have been gathered prior to the removal of that weathered zone by the mechanical prospection. The archaeologists also noted that the quartzite of the terrace pavement and the quartzite in and around the vein were similarly angular in shape. The quartzite of the pavement does not appear to have been exposed for the many hundreds or thousands of years that would typically be necessary to dull and round the sharp edges of the pavement cobbles.

The examination of the degree of weathering of the constituent rocks in the rock features of ISEGS-01 suggest that the features were constructed decades to centuries ago, but not millennia. The constituent rock of the rock features is predominantly the Precambrian metamorphic rock that composes the inselberg that hosts ISEGS-01 and that is found as the major component of the colluvium that mantles the inselberg. The metamorphic rock of the colluvium was presumably the source of the rock used to construct the site features. The slab- or tabular-shaped rocks are typically partially buried or seated in the inselberg's colluvial matrix of finer sediment, and, over time, the colluvial rock is subject to processes of weathering. The exposed portions of the rock are subject to physical and chemical weathering from the sun, rain, and dilute botanical acids, while the buried portions of the rock are subject to processes of pedogenic

alteration that include oxidation or reddening of rock surfaces and the slow accumulation of a $CaCO_3$ rind. Rock that was dislodged from the surface of the inselberg to construct the features on ISEGS-01 would originally have had one side, the exposed side, almost black from the development of rock varnish and the other side, the buried side, a patchwork of deep red staining and beige $CaCO_3$ crust. Over time, the exposure of the rock in the constructed features to the elements slowly washes the red staining and dissolves the $CaCO_3$ until ultimately, neither are apparent. The archaeologists for the applicant quantified the amount of rock in features A and B where red staining was apparent and found that, generally, the number of rocks that had no red staining was greater than would be anticipated if the features were relatively newly constructed. The archaeologists interpreted the degree of red staining found to indicate, grossly, that the features have been in place for decades to centuries.

A final examination was made of the degree to which desert pavements have developed on the flat surfaces or treads of the terraces that are parts of features B and E, and the surface of feature A. Desert pavements that have developed over thousands of years come to exhibit a suite of characteristics that include the progressive leveling of the land surface, the reduction in the size of constituent pavement rocks due to fracturing, the loss of sharp edges on constituent pavement rocks, the progressive darkening of pavement rock as a deeper rock varnish develops, and the progressive accumulation of fine silt among and beneath the surface rock that forms the desert pavement. The archaeologists for the applicant documented the degree to which the terrace treads of features B and E, and the surface of feature A displayed these characteristics and found that, while there was a noticeable accumulation of silt beneath the subject surfaces, the accumulation was relatively slight. The archaeologists found, in consideration of the broader suite of desert pavement characteristics, that the pavements on features A, B, and E were incipient phenomena, not representing thousands of years of development.

The archaeologists for the applicant found, in consideration of the total complement of the field examinations of ISEGS-01, that the construction of the site most likely dates to somewhere from the very late or terminal prehistoric period to the early historic period, and were unable to establish the cultural identity of the people who built the site. The character of the partial quartzite pavement on feature B, the degree of $CaCO_3$ rind removal and the relative loss of red staining on constituent rocks of the rock features on the site, and the incipient character of desert pavement development on those features are the evidentiary basis for the interpretation of the age of the site. The absence of metallic or other artifacts or cultural residues that are clearly associated with the construction or use of the site, and construction techniques and architectural forms that are presently indistinct make it difficult to attribute the site to any particular group of people.

There are a number of aspects of the ISEGS-01 Evaluation Protocol that the applicant did not address that warrant consideration. The protocol requests ("Consultation with Regional Experts" subsection) that the applicant contact and solicit the professional opinions of experts in the archaeology of both the Great Basin and the Southwest. The rock features on the site, several of which resemble agricultural features, are not common archaeological forms in either California or many parts of the Great Basin. The forms may be more common in the eastern and southern Great Basin and in the

Southwest or resemble other forms found there. It does not appear that any of the professionals that the applicant contacted are experts in Southwest archaeology generally or prehistoric agriculture in the Southwest, more particularly. Consultation with experts in these areas may have been useful to the interpretation of the site.

The ISEGS-01 Evaluation Protocol also requests that the applicant examine the rock features of the site to ascertain what the feature construction methods were. The applicant chose to focus on questions of the relative age of the features to the exclusion of considerations of how the features were built, the potential functions of the individual feature types, or how, potentially, the functions of the feature types may articulate the overall use of the site.

ISEGS-01 appears to be an odd grouping of agricultural and non-utilitarian features on a relatively inhospitable knoll in the Mojave Desert, a grouping that does not appear to be typical of California or Great Basin prehistory. The long, narrow, rock-faced terrace series of features B and D appear similar to hillslope agricultural terraces known prehistorically for many parts of the world and still widely in use today. Referring to Energy Commission staff photographs from the May 23, 2008 pedestrian reconnaissance survey of the project area inselbergs, the terrace series of features B and D exhibit attributes that evidence the purposive construction of features to impound sediment. While the one to four courses of jumbled boulders and cobbles that appear to typically compose the single-faced terrace facades convey a sense that terrace construction was expedient, the facades appear to be relatively sound and they appear to be purposively backed, on the upslope face, by a layer of cobbles and gravels. Such a layer is common in agricultural terrace construction, with the purpose of helping to impound the sediment behind the terrace facade so that the sediment is less likely to erode downslope through the terrace face. Whether the terrace fill that the archaeologists for the applicant describe as typically being a silty, clast-supported matrix would support or inhibit plant growth is unknown.

What appear to be non-utilitarian features are found in and among the terrace series of ISEGS-01. There is the stand-alone, triangular rock feature, feature A that essentially forms a small rock platform. The construction method of the facade of the feature appears to parallel that of the terrace series, while the fill of the feature appears, on the basis of the photographs in the confidential technical memorandum of December 5, 2008, to be primarily angular cobbles of the local metamorphic rock. Other apparently non-utilitarian features include the rock upright that abuts the partial quartzite pavement on one of the terraces in the feature B terrace series, the quartzite pavement itself, the apparent bench feature which abuts the bedrock outcrop upslope and west of feature B, and the three constructed rock niches built into that same bedrock outcrop. A further anomalous feature is the apparent remnant, dry-stacked rock wall, feature C.

ISEGS-01 is certainly enigmatic. There is presently no reliable *archaeological* means to verify or refute the character of the use of the site. Among innumerable other potential interpretations for the site, Energy Commission and BLM staff wonder whether it may be a late prehistoric or early historic Native American traditional use area, more specifically, a site the use of which may have been ritual in character. The points that BLM would offer in support of this interpretation are the location of the site on a landform that is inhospitable and would appear to represent the economic periphery of

the geography of any people, the presence of the set of the non-utilitarian features above, and the presence of what appear to be agricultural terraces that, while utilitarian in form and construction, are of a scale too small to produce substantive food resource yields, a scale that may indicate the purpose of the terraces is more symbolic than economic. The purpose of the terraces may have been to represent or symbolize agriculture to the users of the site rather than to actually have been used to conduct agriculture.

Whatever the use of ISEGS-01 may have been, Energy Commission and BLM staff only hope that the present inability of our discipline to readily attribute the site to a particular group of people or to a certain span of time does not constrain our willingness to openly face the question of its history.

Archaeological Resources

One archaeological resource, ISEGS-01 is now known to be present in the project area of analysis. The results of the investigation to gather information to evaluate the historical significance of the archaeological site are found in the "Investigation to Evaluate Archaeological Site ISEGS-01" subsection above. A summary of the information from the subsection is provided here as a brief context for BLM recommendation on the eligibility of the resource for listing in the CRHR.

ISEGS-01 is an archaeological site that includes five dry-stacked rock features and feature complexes arranged on either side of the crest of the tiny inselberg directly south of the larger eastern portion of the Precambrian metamorphic inselberg complex, which is east of the Ivanpah No. 3 project site boundary. The feature complexes include eastern and western sets of relatively long, rock-faced terraces, another contiguous series of four, small, roughly square, rock-faced terraces, a stand-alone, triangular rock-faced feature with a fill of angular cobbles of the local metamorphic rock, and a remnant dry-stacked rock wall.

The field inspection of ISEGS-01, its constituent rock features, and the near-vicinity found no artifacts that could be unambiguously associated with the construction or use of the site. No portable material culture objects of any type were found in or among the site features. A sparse scatter of three historic artifacts was found in a range of five to 15 meters from the site.

The investigation of ISEGS-01 was unable to conclusively establish the age or the cultural identity of the builders or users of the site. Neither the review of the archaeological and ethnographic literature relating to rock art and rock feature sites nor the review of Southern Paiute, Chemehuevi, or Mojave architecture and construction methods found any information that could reliably be used to interpret the individual features of ISEGS-01 or the site as a whole. The geophysical prospection of the site and site vicinity with a metal detector produced no signals that would indicate the potential presence of metallic debris. Georchaeological examinations of the rock features of ISEGS-01 for potential indices of the relative age of the site conclude that the probable time of its construction ranges somewhere from the very late or terminal prehistoric period to the early historic period. The archaeologists for the applicant were ultimately unable to establish the cultural identity of the people who built the site. Among innumerable other potential interpretations for the site, Energy Commission and BLM

staff speculate whether it may be a late prehistoric or early historic Native American traditional use area, more specifically, a site the use of which may have been ritual in character.

Given that ISEGS-01, notwithstanding the thorough investigation and consideration of the resource, cannot be associated with events that have made a significant contribution to the broad patterns of our history or with the lives of persons significant in our past, that it cannot be associated with or said to embody the distinctive characteristics of a type, period, or method of construction, that it cannot be associated with or said to represent the work of a master, or possess high artistic values, and that it has not yielded, and is not likely to yield, information important to prehistory or history, the BLM determines that the site does not meet any of the criteria for inclusion on the NRHP. In the FSA, Energy Commission staff recommended that the Energy Commission, as lead agency and pursuant to Title 13, Public Resources Code, section 21084.5, determine that ISEGS-01 is not eligible for listing in the CRHR.

The results of the evaluation of the historical significance of ISEGS-01 constitute a relatively unusual circumstance where the resource is being recommended as not eligible for listing in either the NRHP, because the site cannot be reliably associated with any time period, or any archaeological, ethnographic, or historic culture. BLM staff would like to note here that this circumstance does not necessarily mean that the archaeological site is not, in a more objective sense, historically significant. It is plausible that further future investigation of the resource may ultimately establish the associations necessary to conclude a definitive evaluation of its place in prehistory or history. Federal regulatory historic preservation programs have a defined reach, and ISEGS-01 appears to be beyond the present regulatory reach of NEPA and the NHPA. The consideration of the resource in the present analysis well demonstrates the due diligence of the applicant for the proposed project, and of BLM staff to fulfill the obligations of our regulatory processes.

36-020713, an adit of unknown age with low-lying tailing piles and a bladed loop road, did not include refuse that might have suggested age. This site does not meet any of the criteria for eligibility.36-020714, mining prospect of unknown age with low-lying tailing piles and a small, low rock cairn, does not meet any of the criteria for inclusion on the NRHP.

36-02071, a dismantled rock cairn (mining claim marker) 210 ft. from the adit noted above with no associated debris, is of unknown age and does not meet any of the criteria for eligibility.

Ethnographic Resources

No CRHR-eligible ethnographic resources have yet been found in the project area of analysis.

Built Environment Resources

Several built-environment resources are now known to be present in the proposed project area. They include the Hoover Dam-to-San Bernardino transmission line (CA-SBR10315H), a dismantled, early-to-mid-twentieth-century telephone line and an unimproved, two-track dirt road that parallels it (CA-SBR-12574H), and an

approximately 1,200-foot -long segment of a faint, unimproved two-track dirt road (CA-SBR-12575H), a segment of a dirt road that appears to correspond to the 'Road to Bullion Mine' on the 1885 GLO map (36-020716), a segment of the Arrowhead Highway (CA-SBr-7689H) and ,the remains of Stateline well and corral/stock loading facility (Ca-Sbr-10803H).

Additional consideration is given here to the presence and the historical significance of a discontiguous, multi-element resource, the Hoover Dam-to-San Bernardino transmission facility, which incorporates the material elements that are critical for the resource to transmit electricity.

Hoover Dam-to-San Bernardino Transmission Line (CA-SBR-10315H)

The Hoover Dam-to-San Bernardino transmission line (CA-SBR-10315H) continues in operation today as the Eldorado-Baker-Coolwater-Dunn Siding-Mountain Pass 115-kV transmission line. The line trends approximately northeast to southwest between the proposed Ivanpah No. 1 and No. 2. The typical structures that make up the transmission line are metal, H-frame, riveted, latticed masts and metal crossbeams. The design specifications for the H-frame structures call for the masts to be 17 feet apart and 52 feet tall. The crossbeams that span each pair of masts are approximately 34 feet in length and carry three transmission cables. Only one of the H-frame structures in the project area appears to have been replaced since the original construction of the line. The replacement structure has wooden masts and a wooden crossbeam (pp. 12–14, Solar Partners I et al. 2008f).

Southern Sierras Power Company, a wholly-owned ally company of the Nevada-California Power Company, began construction of the original 132-kV Hoover Dam-to-San Bernardino transmission line in 1930 in BLM Right-of-Way (ROW) Grant No. R 01730 (p. 7, Solar Partners I et al. 2008f). The 225-mile-long line was completed in 1931 in a record 225 days. The original purpose of the line was to carry electricity from the City of San Bernardino to the construction site for Hoover Dam. The line was reversed in August of 1937 to carry electricity back to San Bernardino from Unit A-8, a 55,000-h.p., 40-MW hydroelectric turbine, at Hoover Dam. A telephone line, CA-SBR-12574H, was built in 1931 approximately 3,000 feet to the southeast of the transmission line, also inside the bounds of ROW Grant No. R 01730, to facilitate operational communications along the transmission line (pp. 7, 10, Solar Partners I et al. 2008f).

The BLM and the California State Historic Preservation Officer (SHPO) concluded a consensus determination for the Hoover Dam-to-San Bernardino transmission line on October 22, 1993, as part of a consultation under Section 106 of the National Historic Preservation Act (California Office of Historic Preservation File Nos. ADOE-36-93-007-00 and BLM841127R) (confidential appendix 5.3C, CH2M Hill 2007). The BLM and the SHPO agreed that the resource was individually eligible for inclusion in the NRHP under Criterion A due to its association with the construction of Hoover Dam, and the role of Hoover Dam in the development of the energy industry in the West (p. 9, Solar Partners I et al. 2008f). Under Title 14, California Code of Regulations, section 4851, subdivision (a)(1), the transmission line is on the CRHR as a result of the above consensus determination.

The BLM here determines that CA-SBr-10315H retains sufficient integrity and is individually eligible for inclusion on the NRHP under Criterion A. In addition, the resource is potentially eligible under Criterion C.

CA-SBR-12574H

CA-SBR-12574H is a dismantled telephone line and a parallel, unimproved, two-track dirt access or service road. Only a portion of the resource appears to have been recorded in the project area, an approximately 2,200-foot long segment through the northwestern quadrant of Ivanpah No. 1. The telephone line and the road trend approximately northeast to southwest. Both elements of the resource are traceable in aerial photographs east of Interstate Route 15 and out across Ivanpah Valley.

The telephone line is now a line of wooden utility pole bases that have been cut off approximately 6–12 inches above the present surface of the project area. There is an assemblage of artifacts from the downed line among the pole bases. The assemblage includes a few of the downed cedar poles, which appear to have originally been 25 feet tall with hardware consisting of metal nuts and bolts, metal brackets or plates, metal cable, wooden cross beams, and glass insulators. The insulators (McLAUGHLIN No. 19 and HEMINGRAY–42) indicate a date range for the construction of the telephone line sometime from 1920 to 1967.

The approximately ten-foot-wide, two-track dirt road is about ten feet northwest of and parallel to the telephone line. Ephemeral stream channels appear to dissect the road in a number of places along the recorded road segment.

No other artifacts, beyond the parts of the utility line, were found in association with either element of the resource (DPR 523 series forms, Fergusson 2007).

The telephone line and the dirt access road were built in 1931 under BLM ROW Grant No. R 01730 by the Interstate Telegraph Company, a subsidiary of the Nevada-California Electric Corporation, for the apparent sole purpose of facilitating private transmission line communications along the Hoover Dam-to-San Bernardino transmission line (p. 7, Solar Partners I et al. 2008f). Given the resource's obvious loss of integrity of design, materials, and workmanship, BLM has determined that the portion of CA-SBR-12574H in the project area would not contribute to the eligibility of the line, as a whole, as a stand-alone resource, to the NRHP.

CA-SBR-12575H

CA-SBR-12575H is a faint segment of an unimproved, two-track dirt road that appears to have been abandoned for a while. Only a portion of the road in the project area, an approximately 1,200-foot-long segment through the northwestern quadrant of Ivanpah No. 1, was recorded. The approximately eight-foot-wide dirt road trends roughly east-southeast to west-northwest. The western end of the road continues on out of Ivanpah No. 1 toward the Clark Mountain Range, while the eastern portion of the road becomes progressively more difficult to trace as ephemeral stream channels obliterate the road tracks. No artifacts were found in direct association with the road (p. 5.3-20, CH2M Hill 2007; p. 19 and DPR 523 series forms, Fergusson 2007).

Given that the resource cannot be associated with events that have made a significant contribution to the broad patterns of our history or with the lives of persons significant in our past, that it does not embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic values, that it has not yielded, and is not likely to yield, information important to history, and that the resource does not retain integrity of design, workmanship, feeling, or association, BLM determines that the site does not meet any of the criteria for eligibility for listing on the NRHP.

CA-SBr-7689H

CA-SBr-7689H, the Arrowhead Highway, has been previously determined not eligible by consensus determination by BLM and SHPO in 1994 and by Federal Highways Administration (FHWA) and CA SHPO in 2005.

CA-SBr-10803H

CA-SBr-10803H, remains of Stateline well and corral/stock loading facility, was previous determined not eligible by consensus determination by FHWA and SHPO in 2005. BLM concurs with this determination.

CA-SBr-10806H

CA-SBr-10806H, a segment of the Ivanpah-Providence Road, was previously determined ineligible by consensus determination by FHWA and SHPO in 2005. BLM concurs with this determination.

36-02071

36-02071, a segment of the 'Road to Bullion Mine', does not meet any of the criteria for inclusion on the NRHP.

Summary of NRHP- or CRHR-Eligible Resources for the Ivanpah SEGS Project

There presently appears to be one cultural resource in the proposed project area that is NRHP-eligible. This is the Hoover Dam-to-San Bernardino transmission line (CA-SBR-10315H). The potential impact of the project on this resource and a proposal to mitigate that impact are developed below.

Types of Direct and Indirect Impacts

In the abstract, direct impacts to cultural resources are those associated with project development, construction, and co-existence. Construction usually entails surface and subsurface disturbance of the ground, and direct impacts to archaeological resources may result from the immediate disturbance of the deposits, whether from vegetation removal, vehicle travel over the surface, earth-moving activities, excavation, or demolition of overlying structures. Construction can have direct impacts on historic standing structures when those structures must be removed to make way for new structures or when the vibrations of construction impair the stability of historic structures nearby. New structures can have direct impacts on historic structures when the new structures are stylistically incompatible with their neighbors and the setting, and when the new structures produce something harmful to the materials or structural integrity of the historic structures, such as emissions or vibrations.

Generally speaking, indirect impacts to archaeological resources are those which may result from increased erosion due to site clearance and preparation, or from inadvertent damage or outright vandalism to exposed resource components due to improved accessibility. Similarly, historic structures can suffer indirect impacts when project construction creates improved accessibility and vandalism or greater weather exposure becomes possible.

Ground disturbance accompanying construction at a proposed plant site, along proposed linear facilities, and at a proposed laydown area has the potential to directly impact archaeological resources, unidentified at this time. The potential direct, physical impacts of the proposed construction on unknown archaeological resources are commensurate with the extent of ground disturbance entailed in the particular mode of construction. This varies with each component of the proposed project. Placing the proposed plant into this particular setting could have a direct impact on the integrity of association, setting, and feeling of nearby standing historic structures.

4.4.2.1 Proposed Project

<u>Construction Impacts</u>

Direct Impacts on Archaeological Resources on the Surface of the Project Site

No NRHP-eligible prehistoric or historical archaeological resources are now known to be on the surface of the project site. Given the thorough investigation of the surface of the project site for the present analysis and the dearth of archaeological resources found, it appears to be highly improbable that the construction-related ground disturbance of the project would directly impact surface archaeological resources

Direct Impacts on Buried Archaeological Resources in the Project Site

No properties eligible for inclusion on the NRHP are now known to be beneath the surface of the project site. On the basis of the results of the geoarchaeology study above (pp. 9–18, CH2M Hill 2008j), it is highly improbable that the construction-related ground disturbance of the project, on the portions of the project site where deep (>1m) ground disturbance would occur, would directly impact buried archaeological resources that would qualify as historical resources

Identification and Assessment of Direct Impacts on Ethnographic Resources

No NRHP-eligible ethnographic resources are known to be on the project site or in the project area of analysis. On the basis of the results of the literature and records search and the helicopter and pedestrian reconnaissance survey above and Native American consultation, to date, it presently appears unlikely that construction-related ground disturbance for the project would directly impact ethnographic resources that would qualify as historical resources.

Identification and Assessment of Direct Impacts on Built-Environment Resources and Proposed Mitigation

One NRHP-eligible built-environment resource, the Hoover Dam to San Bernardino transmission line (CA-SBR-10315H) is on the project site. The effects of the proposed

project on the subject transmission line have been found to be cumulative in character, rather than the direct result of the construction, operation, maintenance, closure, and decommissioning of the project (see "Cumulative Scenario" and "Cumulative Impacts and Mitigation" subsections, above and below). No other built-environment resources that qualify as historical resources are known on the project site, and there is virtually no chance, given the stark visual presence of built-environment resources, that new, unknown ones will be found.

Operation Impacts

Any reasonably foreseeable task that the applicant would perform to operate the facility would not impact NRHP-eligible resources, because no such resources appear to be present on the surface of the project area of analysis and the potential presence of archaeological resources beneath the surface of the project area of analysis is thought to be negligible (see "Cultural Resources Inventory Fieldwork" subsection, above).

As the operation of the proposed power plant would not impact any NRHP-eligible resources in the project area of analysis, no mitigation measures have been identified for the operation of the facility.

Closure and Decommissioning Impacts

Closure and decommissioning of the proposed power plant would not impact any NRHP-eligible resources in the project area of analysis. Any reasonably foreseeable task that the applicant would perform to close and decommission the facility would not impact NRHP-eligible resources, because no such resources appear to be present on the surface of the project area of analysis and the potential presence of archaeological resources beneath the surface of the project area of analysis is thought to be negligible (see "Cultural Resources Inventory Fieldwork" subsection, above).

As closure and decommissioning of the proposed power plant would not impact any NRHP-eligible resources in the project area of analysis, no mitigation measures have been identified for this phase of the project.

Beneficial Impacts

BLM has not identified any noteworthy public benefits associated with cultural resources that have been the result of the environmental analyses for the proposed project or that would be the result of the construction, operation, maintenance, closure, or decommissioning of the project.

4.4.2.2 Mitigated Ivanpah 3 Alternative

Construction Impacts

The construction impacts resulting from the Mitigated Ivanpah 3 Alternative would be associated with the disturbance of NRHP-eligible resources during site excavation, grading, road construction, and installation of heliostats. For the proposed project, these impacts were unlikely to occur, given the limited number and extent of these resources identified in existing and project-related surveys. To protect unidentified resources from impacts, a variety of mitigation measures that would require monitoring

during site-disturbance activities, and identification, assessment, and avoidance of any resources have been identified. With adoption of the mitigation measures, the impacts could be mitigated.

The construction of the Mitigated Ivanpah 3 Alternative would be expected to result in the same type and magnitude of potential threat to cultural resources as the proposed project. Like the proposed project, the Mitigated Ivanpah 3 Alternative would require site excavation, grading, road construction, and installation of heliostats, any of which could disturb and result in impacts to resources. Although the size, number of power tower receivers, and number of heliostats would be reduced, it is expected that the construction would involve the same type and amount of equipment, and the same procedures used in ground disturbance activities. The primary difference would be that the area of disturbance associated with the Mitigated Ivanpah 3 Alternative would be reduced by 433 acres, located in the northern portion of Ivanpah Unit 3. This acreage reduction, in itself, reduces the number of resources that may be impacted during project construction.

The reduction of ground disturbance of 433 acres in the northern portion of Ivanpah Unit 3 accounts for a reduction of approximately 12.5 percent from the land area that would be disturbed as part of the proposed project.

One of the impacts associated with the proposed project that the applicant seeks to avoid by proposing the Mitigated Ivanpah 3 Alternative is the amount of grading required to install heliostat fields. The northern portion of Ivanpah 3 is known to have a greater amount of topographic relief than the rest of the project area, with eroded drainage channels that may reach 10 feet deep and 20 feet across. Although the applicant's overall development plan incorporates Low-Impact Development principles, development of the proposed project would require extensive grading in the northern portion of Ivanpah Unit 3, and only limited grading in other portions of the site. Elimination of the 433-acre northern portion of Ivanpah Unit 3 would remove the area of the most intense site disturbance and grading from the project development. Therefore, the Mitigated Ivanpah 3 Alternative would be expected to reduce site disturbance impacts to cultural resources by 12.5 percent over the proposed project. Any remaining potential impacts would be mitigated through the adoption of mitigation measures, as described below.

Operations Impacts

Operations associated with the proposed project would not have an adverse impact on cultural resources. This is due to the fact that all site disturbance would occur during construction, with no additional disturbance occurring during operations. This would also apply to the operation of the Mitigated Ivanpah 3 Alternative.

Closure and Decommissioning Impacts

Closure and decommissioning would involve re-grading of the site to restore original contours and removal of installed infrastructure, activities that would require earthmoving and ground disturbance. These activities could potentially cause impacts to resources that had remained in place following project construction. The potential for this occurrence would be low, as any resources would be expected to be found during

monitoring associated with construction. The potential impacts associated with the Mitigated Ivanpah 3 Alternative would be similar to those for the proposed project, but would occur over a smaller area due to the reduced acreage.

Beneficial Impacts

The Mitigated Ivanpah 3 Alternative would not provide any beneficial impacts associated with cultural resources.

4.4.2.3 Modified I-15 Alternative

Construction Impacts

The construction impacts resulting from the Modified I-15 Alternative would be associated with the disturbance of NRHP-eligible resources during site excavation, grading, road construction, and installation of heliostats. For the proposed project, these impacts were unlikely to occur, given the limited number and extent of these resources identified in existing and project-related surveys. To protect unidentified resources from impacts, mitigation measures would require monitoring during site-disturbance activities, and identification, assessment, and avoidance of any resources identified. With the adoption of mitigation measures, the impacts could be mitigated.

The construction of the Modified I-15 Alternative would be expected to result in the same type and magnitude of potential threat to cultural resources as the proposed project. Like the proposed project, the Modified I-15 Alternative would require site excavation, grading, road construction, and installation of heliostats, any of which could disturb and result in impacts to resources. Although the size, number of power tower receivers, and number of heliostats would be reduced, it is expected that the construction would involve the same type and amount of equipment, and the same procedures used in ground disturbance activities.

The specific resources that could be impacted in the revised Ivanpah Unit 3 location have not been fully inventoried, and impacts cannot be evaluated at this time. The revised Ivanpah Unit 3 location is directly adjacent to Interstate 15 and Ivanpah Unit 1, and very close to the Primm Valley Golf Course, all areas that have undergone extensive development and/or prior surveys for cultural resources. Therefore, while unidentified resources are likely to be present, they are likely to be of the same type as those identified in those adjacent areas. Based on this, the mitigation measures required for the proposed project would be expected to be effective in avoiding and/or mitigating impacts to resources within the Modified I-15 Alternative.

Operations Impacts

Operations associated with the proposed project would not have an adverse impact on cultural resources. This is due to the fact that all site disturbance would occur during construction, with no additional disturbance occurring during operations. This would also apply to the operation of the Modified I-15 Alternative.

Closure and Decommissioning Impacts

Closure and decommissioning would involve re-grading of the site to restore original contours and removal of installed infrastructure, activities that would require earthmoving and ground disturbance. These activities could potentially cause impacts to resources that had remained in place following project construction. The potential for this occurrence would be low, as any resources would be expected to be found during monitoring associated with construction. The potential impacts associated with the Modified I-15 Alternative would be similar to those for the proposed project, but would occur over a smaller area due to the reduced acreage.

Beneficial Impacts

The Modified I-15 Alternative would not provide any beneficial impacts associated with cultural resources.

4.4.2.4 No Action Alternative

In the No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project.
- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If this project is not approved, renewable projects would likely be developed on other sites in the Mojave Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. The No Action Alternative would not cause any adverse impacts to Cultural Resources.

4.4.3 Compliance with Applicable Laws, Regulations, and Supplemental Authorities

If the mitigation measures (below) are properly implemented, then the proposed ISEGS project could result in minimal impacts on known, NRHP-eligible resources. The project would therefore be in compliance with all applicable laws, regulations, and supplemental authorities listed in **Table 4.4-1**.

The County of San Bernardino's General Plan has broad language that declares its goal of preserving and promoting the county-wide preservation of cultural resources, but the only County cultural resources standard with which a development project must comply, by taking specific actions, apply only to the unincorporated areas of the County. The

mitigation measures require specific actions to promote and to effect historic preservation, and to mitigate impacts to eligible resources. Consequently, if ISEGS implements these measures, its actions would be consistent with the cultural resources goals of the County of San Bernardino.

4.4.4 Mitigation Measures

CUL-1 Prior to the start of ground disturbance (includes "preconstruction site mobilization;" "construction ground disturbance;" and "construction grading, boring, and trenching," as defined in the General Conditions for this project), the project owner shall obtain the services of a Cultural Resources Specialist (CRS), and one or more alternate CRSs, if alternates are needed. The CRS shall manage all consultation, monitoring, mitigation, curation, and reporting activities required in accordance with the Conditions of Certification (Conditions). The CRS may elect to obtain the services of Cultural Resource Monitors (CRMs) and other technical specialists, if needed, to assist in monitoring, mitigation, and curation activities. The project owner shall ensure that the CRS makes recommendations regarding the eligibility to the NRHP and the CRHR of any cultural resources that are newly discovered or that may be affected in an unanticipated manner. No ground disturbance shall occur prior to CPM approval of the CRS, unless specifically approved by the BLM's Authorized Officer and the CPM. Approval of a CRS may be denied or revoked for non-compliance on this or other projects.

Cultural Resources Specialist

The resumes for the CRS and alternate(s) shall include information demonstrating to the satisfaction of the BLM's Authorized Officer and the CPM that their training and background conform to the U.S. Secretary of Interior Guidelines, as published in the Code of Federal Regulations, 36 CFR Part 61. In addition, the CRS shall have the following qualifications:

1. The CRS's qualifications shall be appropriate to the needs of the project and shall include a background in anthropology, archaeology, history, architectural history, or a related field; and
2. At least three years of archaeological or historic, as appropriate, resource mitigation and field experience in California.

The resume of the CRS shall include the names and telephone numbers of contacts familiar with the work of the CRS on referenced projects, and demonstrate that the CRS has the appropriate education and experience to accomplish the cultural resource tasks that must be addressed during ground disturbance, grading, construction, and operation.

Cultural Resources Monitors

CRMs shall have the following qualifications:

1. a BS or BA degree in anthropology, archaeology, historical archaeology or a related field and one year experience monitoring in California; or

2. an AS or AA degree in anthropology, archaeology, historical archaeology or a related field, and four years experience monitoring in California; or
3. enrollment in upper division classes pursuing a degree in the fields of anthropology, archaeology, historical archaeology or a related field, and two years of monitoring experience in California.

Cultural Resources Technical Specialists

The resume(s) of any additional technical specialists, e.g., historical archaeologist, historian, architectural historian, and/or physical anthropologist, shall be submitted to the BLM's Authorized Officer and the CPM for approval.

Verification:

1. At least 45 days prior to the start of ground disturbance, the project owner shall submit the resume for the CRS, and alternate(s), if desired, to the BLM's Authorized Officer and the CPM for review and approval.
2. At least 10 days prior to a termination or release of the CRS, or within 10 days after the resignation of a CRS, the project owner shall submit the resume of the proposed new CRS to the BLM's Authorized Officer and the CPM for review and approval. At the same time, the project owner shall also provide to the approved new CRS the AFC and all cultural documents, field notes, photographs, and other cultural materials generated by the project. If there is no alternate CRS in place to conduct the duties of the CRS, a previously approved monitor may serve in place of a CRS so that construction may continue up to a maximum of 3 days without a CRS. If cultural resources are discovered, then construction will remain halted until there is a CRS or alternate CRS to make a recommendation regarding significance.
3. At least 20 days prior to ground disturbance, the CRS shall provide a letter naming anticipated CRMs for the project and stating that the identified CRMs meet the minimum qualifications for cultural resource monitoring required by this Condition. If additional CRMs are obtained during the project, the CRS shall provide additional letters to the BLM's Authorized Officer and the CPM identifying the CRMs and attesting to the qualifications of the CRMs, at least five days prior to the CRMs beginning on-site duties.
4. At least 10 days prior to beginning tasks, the resume(s) of any additional technical specialists shall be provided to the BLM's Authorized Officer and the CPM for review and approval.
5. At least 10 days prior to the start of ground disturbance, the project owner shall confirm in writing to the BLM's Authorized Officer and the CPM that the approved CRS will be available for onsite work and is prepared to implement the cultural resources Conditions.

CUL-2 Prior to the start of ground disturbance, if the CRS has not previously worked on the project, the project owner shall provide the CRS with copies of the AFC, data responses, and confidential cultural resources reports for the project. The project owner shall also provide the CRS, the BLM's Authorized Officer, and the CPM with maps and drawings showing the footprint of the

power plant and all linear facilities. Maps shall include the appropriate USGS quadrangles and a map at an appropriate scale (e.g., 1:2000 or 1" = 200') for plotting cultural features or materials. If the CRS requests enlargements or strip maps for linear facility routes, the project owner shall provide copies to the CRS. The BLM's Authorized Officer and the CPM shall review submittals and, in consultation with the CRS, approve those that are appropriate for use in cultural resources planning activities. No ground disturbance shall occur prior to CPM approval of maps and drawings, unless specifically approved by the BLM's Authorized Officer and the CPM.

If construction of the project would proceed in phases, maps and drawings, not previously provided, shall be submitted prior to the start of each phase. Written notification identifying the proposed schedule of each project phase shall be provided to the CRS and CPM.

At a minimum, the CRS shall consult weekly with the project construction manager to confirm area(s) to be worked during the next week, until ground disturbance is completed, and the project owner shall ensure that the project construction manager is available for such weekly consultations.

The project owner shall notify the CRS and CPM of any changes to the scheduling of the construction phases. No ground disturbance shall occur prior to CPM approval of maps and drawings, unless specifically approved by the BLM's Authorized Officer and the CPM.

Verification:

1. At least 40 days prior to the start of ground disturbance, the project owner shall provide the AFC, data responses, and confidential cultural resource documents to the CRS, if needed, and the subject maps and drawings to the CRS and CPM. The BLM's Authorized Officer and the CPM will review submittals in consultation with the CRS and approve maps and drawings suitable for cultural resources planning activities.
2. If there are changes to any project related-footprint, revised maps and drawings shall be provided at least 15 days prior to start of ground disturbance and construction for those changes.
3. If project construction is phased, if not previously provided, the project owner shall submit the subject maps and drawings 15 days prior to each phase.
4. On a weekly basis during ground disturbance, a current schedule of anticipated project activity shall be provided to the CRS and CPM by letter, email, or fax.
5. Within five days of identifying changes, the project owner shall provide written notice of any changes to scheduling of construction phase.

CUL-3 Prior to the start of ground disturbance, the project owner shall submit the Cultural Resources Monitoring and Mitigation Plan (CRMMP), as prepared by or under the direction of the CRS, to the BLM's Authorized Officer and the CPM for review and approval. The CPM shall provide the project owner with a model CRMMP to adapt for project use. The CRMMP shall identify general

and specific measures to minimize potential impacts to sensitive cultural resources. Implementation of the CRMMP shall be the responsibility of the CRS and the project owner. Copies of the CRMMP shall reside with the CRS, alternate CRS, each monitor, and the project owner's on-site construction manager. No ground disturbance shall occur prior to CPM approval of the CRMMP, unless specifically approved by the BLM's Authorized Officer and the CPM.

The CRMMP shall include, but not be limited to, the following elements and measures:

1. The following statement included in the Introduction: "Any discussion, summary, or paraphrasing of the Conditions in this CRMMP is intended as general guidance and as an aid to the user in understanding the Conditions and their implementation. The Conditions, as written in the Commission Decision, shall supersede any summarization, description, or interpretation of the Conditions in the CRMMP. The Cultural Resources Conditions of Certification from the Commission Decision are contained in Appendix A."
2. A proposed general research design that includes a discussion of archaeological research questions and testable hypotheses specifically applicable to the local prehistory and history of the project area, and a discussion of artifact collection, retention/disposal, and curation policies as related to the research questions formulated in the research design. The research design shall specify that the preferred treatment strategy for any buried archaeological deposits is avoidance. A mitigation plan shall be prepared for any NRHP-eligible resource (as determined by the BLM's Authorized Officer) or any CRHR-eligible resource (as determined by the CPM), impacts to which cannot be avoided. A prescriptive treatment plan may be included in the CRMMP for limited data types.
3. Specification of the implementation sequence and the estimated time frames needed to accomplish all project-related tasks during the ground disturbance and post-ground–disturbance analysis phases of the project.
4. Identification of the person(s) expected to perform each of the tasks, their responsibilities, and the reporting relationships between project construction management and the mitigation and monitoring team.
5. A description of the manner in which Native American observers or monitors will be included, the procedures to be used to select them, and their role and responsibilities.
6. A description of all impact avoidance measures (such as flagging or fencing), to prohibit or otherwise restrict access to sensitive resource areas that may be found during construction and/or operation and may subsequently need to be avoided, and identification of the areas where these measures are to be implemented. The description shall address

how these measures would be implemented and how long they would be needed to protect the resources from project-related effects.

7. A statement that all cultural resources encountered shall be recorded on a DPR form 523 and mapped and photographed. In addition, all archaeological materials collected as a result of the archaeological investigations (survey, testing, and data recovery) shall be curated in accordance with the State Historical Resources Commission's "Guidelines for the Curation of Archaeological Collections," into a retrievable storage collection in a public repository or museum.

8. A statement that the project owner will pay all curation fees for artifacts recovered and for related documentation produced during cultural resources investigations conducted for the project. The project owner shall identify three possible curation facilities that could accept cultural resources materials resulting from project activities.

9. A statement that the CRS has access to equipment and supplies necessary for site mapping, photographing, and recovering any cultural resource materials that are encountered during ground disturbance and that cannot be treated prescriptively.

10. A description of the contents and format of the Cultural Resource Report (CRR), which shall be prepared according to Archaeological Resource Management Report (ARMR) Guidelines.

Verification:

1. Upon approval of the CRS proposed by the project owner, the CPM will provide to the CRS an electronic copy of the model CRMMP.
2. At least 30 days prior to the start of ground disturbance, the project owner shall submit the subject CRMMP to the BLM's Authorized Officer and the CPM for review and approval. Ground disturbance may not commence until the CRMMP is approved, unless specifically approved by the BLM's Authorized Officer and the CPM.
3. At least 30 days prior to the start of ground disturbance, a letter shall be provided to the BLM's Authorized Officer and the CPM indicating that the project owner agrees to pay curation fees for any materials collected as a result of the archaeological investigations (survey, testing, data recovery).

CUL-4 The project owner shall submit the CRR to the BLM's Authorized Officer and the CPM for approval. The CRR shall be written by or under the direction of the CRS and shall be provided in the ARMR format. The CRR shall report on all field activities related to the implementation of the CRMMP including dates, times and locations, findings, samplings, and analyses. All survey reports, DPR 523 forms, and additional research reports not previously submitted to the CHRIS and the SHPO shall be included as an appendix to the CRR.

If the project owner requests a suspension of ground disturbance and/or construction activities, then a draft CRR that covers all cultural resources

activities associated with the project shall be prepared by the CRS and submitted to the BLM's Authorized Officer and the CPM for review and approval on the same day as the suspension/extension request. The draft CRR shall be retained at the project site in a secure facility until ground disturbance and/or construction resumes or the project is withdrawn. If the project is withdrawn, then a final CRR shall be submitted to the BLM's Authorized Officer and the CPM for review and approval at the same time as the withdrawal request.

Verification:

1. Within 90 days after completion of ground disturbance (including landscaping), the project owner shall submit the CRR to the BLM's Authorized Officer and the CPM for review and approval. If any reports have previously been sent to the CHRIS, then receipt letters from the CHRIS or other verification of receipt shall be included in an appendix.
2. Within 90 days after completion of ground disturbance (including landscaping), the project owner shall provide to the BLM's Authorized Officer and the CPM a copy of an agreement with, or other written commitment from, a curation facility that meets the standards stated in the California State Historical Resources Commission's *Guidelines for the Curation of Archaeological Collections*, to accept cultural materials, if any, from this project. Any agreements concerning curation will be retained and available for audit for the life of the project.
3. Within 10 days after CPM approval of the CRR, the project owner shall provide documentation to the BLM's Authorized Officer and the CPM that copies of the CRR have been provided to the SHPO, the CHRIS, the curating institution, if archaeological materials were collected, and to the Chairperson(s) of any Native American groups requesting copies of project-related reports.
4. Within 30 days after requesting a suspension of construction activities, the project owner shall submit a draft CRR to the BLM's Authorized Officer and the CPM for review and approval.

CUL-5 Prior to and for the duration of ground disturbance, the project owner shall provide WEAP training to all new workers within their first week of employment at the project site and on the linear facilities. The training shall be prepared by the CRS, may be conducted by any member of the archaeological team, and may be presented in the form of a video. The CRS shall be available (by telephone or in person) to answer questions posed by employees. The training may be discontinued when ground disturbance, including landscaping, is completed. The training shall include:

1. A discussion of applicable laws and penalties under the law;
2. Samples or visuals of artifacts that might be found in the project vicinity;
3. A discussion of what such artifacts may look like when partially buried, or wholly buried and then freshly exposed;

4. A discussion of what prehistoric and historical archaeological deposits look like at the surface and when exposed during construction, and the range of variation in the appearance of such deposits;
5. Instruction that the CRS, alternate CRS, and CRMs have the authority to halt construction in the area of a discovery to an extent sufficient to ensure that the resource is protected from further impacts, as determined by the CRS;
6. Instruction that employees are to halt work on their own in the vicinity of a potential cultural resources discovery and shall contact their supervisor and the CRS or CRM, and that redirection of work would be determined by the construction supervisor and the CRS;
7. An informational brochure that identifies reporting procedures in the event of a discovery;
8. An acknowledgement form signed by each worker indicating that they have received the training; and
9. A sticker that shall be placed on hard hats indicating that environmental training has been completed.

No ground disturbance shall occur prior to implementation of the WEAP program, unless such activities are specifically approved by the BLM's Authorized Officer and the CPM.

Verification:

1. At least 30 days prior to the beginning of ground disturbance, the CRS shall provide the training program draft text and graphics and the informational brochure to the BLM's Authorized Officer and the CPM for review and approval, and the CPM will provide to the project owner a WEAP Training Acknowledgement form for each WEAP-trained worker to sign.
2. On a monthly basis, the project owner shall provide in the MCR the WEAP Training Acknowledgement forms of persons who have completed the training in the prior month and a running total of all persons who have completed training to date.

CUL-6 The project owner shall ensure that construction is immediately halted should anyone discover buried archaeological materials on the project site or linear facilities (Discovery). Archaeological materials may include, but are not limited to, such items as whole or fragmentary flaked or ground stone tools, stone flaking debris, discolored, fire-altered rock, animal bone, charcoal, ash, discolored, burned earth, rocks and minerals not common to the project site, and fragments of ceramic, glass, or metal. In the event of such a Discovery, the project owner shall ensure the immediate notification of the CRS, who shall either evaluate the NRHP and CRHR eligibility of the Discovery, in person, on the project site, or supervise the evaluations that a CRM or an appropriate cultural resources technical specialist would make of the historical significance of the Discovery, also in person, on the project. The recommendations of significance shall be substantiated by and reported to

the BLM's Authorized Officer and the CPM by the CRS. Redirection of ground disturbance shall be accomplished under the direction of the construction supervisor, in a manner agreed to by the CRS.

In the event cultural resources that are over 50 years of age or that may be considered NRHP- or CRHR-eligible are found, or impacts to such resources can be anticipated, construction shall be halted or redirected in the immediate vicinity of the Discovery sufficient to ensure that the resource is protected from further impacts. The halting or redirection of construction shall remain in effect until either the CRS, a CRM, or appropriate cultural resources technical specialist has made evaluations of the historical significance of the Discovery, and all of the following have also occurred:

1. The CRS has notified the project owner, and the BLM's Authorized Officer and the CPM have been notified within 24 hours of the Discovery, or by Monday morning if the cultural resources Discovery occurs between 8:00 AM on Friday and 8:00 AM on Sunday morning, including a description of the Discovery (or changes in character or attributes), the action taken (i.e. work stoppage or redirection), recommendations of eligibility, and recommendations for mitigation of any cultural resources Discoveries, whether or not a determination of significance has been made.
2. The CRS has ensured completion of field notes, measurements, and photography for a DPR 523 primary form. The "Description" entry of the 523 form shall include a recommendation on the significance of the find. The project owner shall submit completed forms to the BLM's Authorized Officer and the CPM.
3. The CRS, the project owner, and the BLM's Authorized Officer and the CPM have conferred, and the BLM's Authorized Officer and the CPM have concurred with the recommended eligibility of the Discovery and approved the CRS's proposed data recovery, if any, including the curation of the artifacts, or other appropriate mitigation; and any necessary data recovery and mitigation have been completed.
4. The CRS, the BLM's Authorized Officer and the CPM have conferred, and the BLM's Authorized Officer and the CPM have determined whether the Discovery reveals new information about the subsurface archaeological character of the project site that warrants the initiation of monitoring for portions of the project site.
5. When the BLM's Authorized Officer and the CPM make a determination that a Discovery does reveal new information about the subsurface archaeological character of the project site that warrants the initiation of monitoring for portions of the project site, the BLM's Authorized Officer and the CPM shall provide notification, by letter or e-mail, to the project owner and the CRS, where on the project site monitoring shall be necessary and why, and notification that **CUL-7** shall be implemented for the subject portions of the project site.

Verification:

1. At least 30 days prior to the start of ground disturbance, the project owner shall provide the BLM's Authorized Officer, the CPM, and the CRS with a letter confirming that the CRS, alternate CRS, and CRMs have the authority to halt construction activities in the vicinity of a cultural resources Discovery, and that the project owner shall ensure that the CRS notifies the BLM's Authorized Officer and the CPM within 24 hours of a Discovery, or by Monday morning if the cultural resources Discovery occurs between 8:00 AM on Friday and 8:00 AM on Sunday morning.
2. Completed DPR form 523s shall be submitted to the BLM's Authorized Officer and the CPM for review and approval no later than 24 hours following the notification of the BLM's Authorized Officer and the CPM, or 48 hours following the completion of data recordation/recovery, whichever is more appropriate for the subject cultural material.

CUL-7 If there is a discovery of archaeological material, and after the BLM's Authorized Officer and the CPM notify the project owner and the CRS that the initiation of monitoring is necessary for portions of the project site or linear facilities, the project owner shall ensure that the CRS, alternate CRS, or CRMs shall monitor full time on the portions of the project site and linear facilities which the BLM's Authorized Officer and the CPM may specify, and ground disturbance full time on the portions of the laydown areas or other ancillary areas which the BLM's Authorized Officer and the CPM may also specify, to ensure there are no impacts to further undiscovered resources and to ensure that newly found resources are not further impacted in an unanticipated manner.

Full-time archaeological monitoring for this project shall be the archaeological monitoring of all earth-moving activities on the portions of the construction site or the linear facility routes which the BLM's Authorized Officer and the CPM may specify for as long as the activities are ongoing. Full-time archaeological monitoring shall require one monitor per active earthmoving machine working in archaeologically sensitive areas, as determined by the CRS in consultation with the BLM's Authorized Officer and the CPM. If an excavation area is too large for one monitor to effectively observe the soil removal, one or more additional monitors shall be retained to observe the area.

In the event that the CRS determines that the current level of monitoring is not appropriate in certain locations, a letter or e-mail detailing the justification for changing the level of monitoring shall be provided to the BLM's Authorized Officer and the CPM for review and approval prior to any change in the level of monitoring.

The research design in the CRMMP shall govern the collection, treatment, retention/disposal, and curation of any archaeological materials encountered.

On forms provided by the CPM, CRMs shall keep a daily log of any monitoring and other cultural resource activities and any instances of non-compliance with the Conditions and/or applicable LORS. Copies of the daily

logs shall be provided to the BLM's Authorized Officer and the CPM by the CRS as directed by the BLM's Authorized Officer and the CPM. The CRS shall use these logs to compile a monthly summary report on the progress or status of cultural resources-related activities. If there are no monitoring activities, the summary report shall specify why monitoring has been suspended. The CRS or alternate CRS shall report daily to the BLM's Authorized Officer and the CPM on the status of cultural resources-related activities at the project site, unless reducing or ending daily reporting is requested by the CRS and approved by the BLM's Authorized Officer and the CPM.

The CRS, at his or her discretion, or at the request of the BLM's Authorized Officer and the CPM, may informally discuss cultural resource monitoring and mitigation activities with Energy Commission technical staff.

Cultural resources monitoring activities are the responsibility of the CRS. Any interference with monitoring activities, removal of a monitor from duties assigned by the CRS, or direction to a monitor to relocate monitoring activities by anyone other than the CRS shall be considered non-compliance with these Conditions.

Upon becoming aware of any incidents of non-compliance with the Conditions and/or applicable LORS, the CRS and/or the project owner shall notify the BLM's Authorized Officer and the CPM by telephone or e-mail within 24 hours. The CRS shall also recommend corrective action to resolve the problem or achieve compliance with the Conditions. When the issue is resolved, the CRS shall write a report describing the issue, the resolution of the issue, and the effectiveness of the resolution measures. This report shall be provided in the next MCR for the review of the BLM's Authorized Officer and the CPM.

A Native American monitor shall be obtained to monitor ground disturbance in areas where Native American artifacts may be discovered. Informational lists of concerned Native Americans and Guidelines for monitoring shall be obtained from the Native American Heritage Commission. Preference in selecting a monitor shall be given to Native Americans with traditional ties to the area that shall be monitored.

Verification:

1. At least 30 days prior to the start of ground disturbance, the CPM will provide to the CRS an electronic copy of the form to be used as a daily monitoring log.
2. Daily, the CRS shall provide a statement that "no cultural resources over 50 years of age were discovered" to the BLM's Authorized Officer and the CPM as an e-mail or in some other form acceptable to the BLM's Authorized Officer and the CPM. If the CRS concludes that daily reporting is no longer necessary, a letter or e-mail providing a detailed justification for the decision to reduce or end daily reporting shall be provided to the BLM's Authorized Officer and the CPM for review and approval at least 24 hours prior to reducing or ending daily reporting.

3. On a monthly basis, while monitoring is on-going, the project owner shall include in each MCR a copy of the monthly summary report of cultural resources-related monitoring prepared by the CRS. Copies of daily logs shall be retained by the project owner and made available for audit by the BLM's Authorized Officer and the CPM.
4. At least 24 hours prior to implementing a proposed change in monitoring level, documentation justifying the change shall be submitted to the BLM's Authorized Officer and the CPM for review and approval.

CUL-8 Prior to the dismantling, by any party, of any portion of the Hoover Dam-to-San Bernardino transmission line (CA-SBR-10315H) located with the boundaries of the project site, the project owner shall obtain the services of an architectural historian. The project owner shall provide the BLM's Authorized Officer and the CPM with the name and resume of the architectural historian. No ground disturbance shall occur prior to CPM approval of the architectural historian, unless specifically approved by the BLM's Authorized Officer and the CPM.

The resume for the architectural historian shall include names and telephone numbers of contacts familiar with the architectural historian's work and all information needed to demonstrate that the architectural historian has the following qualifications:

1. meets the Secretary of Interior's Professional Standards for architectural history;
2. has at least three years experience in recording twentieth-century industrial structures; and
3. has completed at least one recordation project within the past five years involving coordination with the National Park Service's Heritage Documentation Program (HDP).

<u>**Verification:**</u>

1. At least 90 days prior to the dismantling of any portion of the Hoover Dam-to-San Bernardino transmission line located within the boundaries of the project site, the project owner shall submit the name and resume of the selected architectural historian to the BLM's Authorized Officer and the CPM for review and approval.
2. At least 75 days prior to the dismantling of any portion of the Hoover Dam-to-San Bernardino transmission line located within the boundaries of the project site, the project owner shall confirm in writing to the BLM's Authorized Officer and the CPM that the approved architectural historian is available for onsite work and provide a date by which the architectural historian will undertake the HAER-type documentation of the tower types and the cabling system of the portion of the Hoover Dam-to-San Bernardino transmission line located within the boundaries of the project site.

CUL-9 Prior to the dismantling, by any party, of any portion of the Hoover Dam-to-San Bernardino transmission line (CA-SBR-10315H) located within the boundaries of the project site, the project owner shall ensure that the

approved architectural historian prepares HAER-type documentation of the historic context and historic setting of the resource, and recordation of those physical parts of the Hoover Dam-to-San Bernardino transmission line that are located within the boundaries of the project site. The project owner shall ensure that the architectural historian consults with the HABS/HAER Coordinator in the Pacific West Regional Office of the HDP, in Oakland, and complies with the Coordinator's guidance on the extent and content of documentation appropriate for the Hoover Dam-to-San Bernardino transmission line, as a resource eligible for inclusion in the National Register of Historic Places, and on the format and materials to be used in the documentation. No dismantling of the Hoover Dam-to-San Bernardino transmission line located within the boundaries of the project area shall occur prior to the completion, by the architectural historian, of the recording, in the field, of the historic setting and the portion of the line located within the boundaries of the project site, and the submission to and approval by the BLM's Authorized Officer and the CPM of the draft HAER-type documentation of the Hoover Dam-to-San Bernardino transmission line, unless specifically allowed by the BLM's Authorized Officer and the CPM.

<u>**Verification:**</u>

1. At least 60 days prior to the dismantling, by any party, of any portion of the Hoover Dam-to-San Bernardino transmission line located within the boundaries of the project site, the project owner shall submit to the BLM's Authorized Officer and the CPM a letter or memorandum from the architectural historian detailing the scope of the HDP-recommended documentation of the resource.
2. At least 30 days prior to the dismantling, by any party, of any portion of the Hoover Dam-to-San Bernardino transmission line located within the boundaries of the project site, the project owner shall provide a copy of the draft HAER-type documentation of the resource to the BLM's Authorized Officer and the CPM for review and approval.
3. Within 90 days after completion of ground disturbance (including landscaping) the project owner shall include in an appendix to the CRR copies of the transmittal letters for the submission of copies of the final HAER-type documentation of the portion of the Hoover Dam-to-San Bernardino transmission line located within the boundaries of the project site to the California State Library and to at least two local libraries in San Bernardino County, and a copy of the letter of acceptance of the final HAER documentation by the Library of Congress, if accepted by that repository.
4. Alternately, at least 150 days prior to the dismantling, by any party, of any portion of the Hoover Dam-to-San Bernardino transmission line located within the boundaries of the project site, the project owner may submit to the BLM's Authorized Officer and the CPM, for review and approval, a copy of final HAER-type documentation of the portion of the Hoover Dam-to-San Bernardino transmission line located within the boundaries of the project site produced by any party, that meets HAER-type standards. If the project owner chooses this alternative, within 90 days after completion of ground disturbance (including landscaping), the project owner shall

include in an appendix to the CRR copies of the transmittal letters for the submission of copies of the alternative final HAER-type documentation to the California State Library and to at least two local libraries in San Bernardino County.

CUL-10 If fill soils must be acquired from a non-commercial borrow site or disposed of to a non-commercial disposal site, unless less-than-five-year-old surveys of these sites for archaeological resources are documented to and approved by the BLM's Authorized Officer and the CPM, the CRS shall survey the borrow and/or disposal site(s) for cultural resources and record on DPR 523 forms any that are identified. When the survey is completed, the CRS shall convey the results and recommendations for further action to the project owner and the BLM's Authorized Officer and the CPM, who will determine what, if any, further action is required. If the BLM's Authorized Officer and the CPM determines that significant archaeological resources that cannot be avoided are present at the borrow site, all these conditions of certification shall apply. The CRS shall report on the methods and results of these surveys in the CRR.

Verification:

1. As soon as the project owner knows that a non-commercial borrow site and/or disposal site will be used, he/she shall notify the CRS and CPM and provide documentation of previous archaeological survey, if any, dating within the past five years, for CPM approval.
2. In the absence of documentation of recent archaeological survey, **at least 30 days prior** to any soil borrow or disposal activities on the noncommercial borrow and/or disposal sites, the CRS shall survey the site/s for archaeological resources. The CRS shall notify the project owner and the BLM's Authorized Officer and the CPM of the results of the cultural resources survey, with recommendations, if any, for further action.

4.4.5 Summary

The proposed project would have no diirect or indirect adverse impacts on known or unknown, NRHP-eligible archaeological, ethnographic, or built-environment resources. With the adoption and implementation of mitigation measures **CUL-8** and **CUL-9**, the cumulative effect of the proposed project on the one presently known NRHP-eligible listed resource, the Hoover Dam-to-San Bernardino transmission line (CA-SBR-10315H), would be reduced.

The implementation of mitigation measures **CUL-1** through **CUL-7** and **CUL-10** would require identification and proper management of any resources found during the course of the construction, operation, maintenance, closure, or decommissioning of the project. **CUL-1** through **CUL-7**, and **CUL-10** are intended to facilitate the identification and assessment of previously unknown archaeological resources encountered during construction-related ground disturbance and to mitigate any adverse impacts from the project on any newly found resources assessed as NRHP-eligible. To accomplish this, mitigation measures provide for the hiring of a Cultural Resources Specialist and archaeological monitors, for cultural resources awareness training for construction

workers, for the archaeological and Native American monitoring of ground-disturbing activities, in particular situations, for the recovery of data from NRHP-eligible discovered archaeological deposits, for the writing of a technical archaeological report on all archaeological activities and findings, and for the curation of recovered artifacts and other data. When properly implemented and enforced, these mitigation measures would reduce any adverse impacts to previously unknown cultural resources encountered during construction or operation. Additionally, with the adoption and implementation of these mitigation measures, the ISEGS project would be in conformity with all applicable laws and regulations.

Overall, the cultural resource impacts associated with the Mitigated Ivanpah 3 and Modified I-15 Alternatives would be lower than those associated with the proposed project due to the reduced acreage that would be disturbed during construction. For the Modified I-15 Alternative, an area comprising 1,836 acres, which is the reconfigured location of Ivanpah Unit 3, has not had a cultural resources inventory conducted, and could potentially contain resources that would be impacted, and which would not be addressed by the proposed mitigation measures.

Table 4.4-8
Comparison of Cultural Resources Impacts

Potential Impact	Proposed Project	Mitigated Ivanpah 3 Alternative	Modified I-15 Alternative	No Action Alternative
NRHP-eligible resources	Construction could impact resources. Impact would be mitigated.	Lower than proposed project, higher than No Action. Impact would be mitigated.	Lower than proposed project, higher than No Action. Impact would be mitigated.	No potential impact

Plate 4.4-1
ISEGS - Looking WSW across Ivanpah No.2

U.S. BUREAU OF LAND MANAGEMENT and CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, OCTOBER 2009
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